D2.5

National reports with a review and synthesis of the collated information

Jos Brils et al.

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D2.5: National reports with a review and synthesis of the collated information

List of abbreviations

AHDB	Agriculture and Horticulture Development Board
ANR	French National Research Agency
ATES	Aquifer Thermal Energy Storage
BBSR	Bundesinstitut für Bau-, Stadt-, und Raumforschung (German Federal Institute for Research on Building, Urban Affairs and Spatial Development)
BBSRC	Biotechnology and Biological Sciences Research Council
BFN	Bundesamt für Naturschutz (German Federal Agency for Nature Conservation)
BMBF	Bundesministerium für Bildung und Forschung (German Federal Ministry of Education and Research)
BMLFUW	Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft (Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management)
BMUB	Bundesminiterium für Umwelt, Naturschutz, Bau und Reaktorsichertheit (German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety)
BMVIT	Bundesministerium für Verkehr, Innovation und Technologie (Austrian Federal Ministry for Transport, Innovation and Technology)
BMWFJ	Bundesministerium für Wissenschaft, Forschung und Wirtschaft (Austrian Federal Ministry of Economy, Family and Youth)
BMWFW	Bundesministerium für Wissenschaft, Forschung und Wirtschaft (Austrian Federal Ministry of Science)
BOA	BeleidsOndersteunend Advies (Policy supporting research)
BOKU	University of Natural Resources and Life Sciences, Vienna
CAP	Common Agricultural Policy
CCS	Carbon capture and storage
COP	Community Of Practice
Defra	Department of the Environment Food and Rural Affairs
DFG	Deutsche Forschungsgemeinschaft (German Research Association)
DoA	Description of Action
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EU	European Union
EEA	Environment Agency Austria
EPSRC	Engineering and physical sciences research council
ERANET	European Research Area Network

ESRC	Economic and social research council
ExWoSt	Experimenteller Wohnungs- und Städtebau (Experimental Housing and City Construction)
FONA	Forschung für Nachhaltige Entwicklung (Research for Sustainability)
GHG	Greenhouse Gas
GIZ	Gesellschaft für Internationale Zusammenarbeit
IAB	International Advisory Board
INSPIRATION	INtegrated Spatial PlannIng, land use and soil management Research AcTION
JPI	Joint Programming Initiatives
KIBO	Kennis en Innovatieprogramma Bodem en Ondergrond (Knowledge and Innovation programma Soil and Subsurface)
NERC	Natural environment research council
NFP	National Focal Point
NGO	Non-Governmental Organization
NKS	National Key Stakeholder
ÖROK	Austrian Conference on Spatial Planning
R&I	Research & Innovation
RWS	RijksWaterStaat
SDG	Sustainable Development Goals
SME	Small and medium-sized enterprises
SNR	French National Research Strategy
SPI	Science Policy Interface
SRA	Strategic Research Agenda
SSW(-system)	Soil-Sediment-Water(-system)
STOWA	Stichting Toegepast Onderzoek Waterbeheer (Foundation for Applied Water Research)
SWOT	Strengths, Weaknesses, Opportunities, Threats
TKI	Topconsortia voor Kennis en Innovatie (Top consortia for Knowledge and Innovation)
UBA	Umweltbundesamt (German Environment Agency)
Wbb	Wet bodembescherming (Soil Protection Act)
WFD	Water Framework Directive
WP	Work Package

1. Introduction

1.1 About INSPIRATION

The aim of INSPIRATION is to establish and promote the adoption of a strategic research agenda for land use, land-use changes and soil management in the light of current and future societal challenges. Main objectives are:

- **Formulate, consult on and revise an end-user oriented strategic research agenda (SRA);**
- **Scope out models for implementing the SRA;**
- **Prepare a network of public and private funding institutions willing to commonly fund the SRA.**

The proposed methodology is based on a multi-stakeholder, multi-national and interdisciplinary approach that covers the variety of stakeholders (public bodies, business, scientific community citizens and society) and the variety of relevant funders. The vehicle to engage with relevant stakeholders across the Member States is a National Focal Point (NFP) in 17 countries[1]. Between March 2015 and March 2016 The NFP's interviewed National Key Stakeholders (NKS), performed a desk study and organized workshops with national stakeholders of funders, end-users and researchers across the various soil and land management disciplines. The goal of these exercises was to gather information and support the main objectives as stated above.

The collated results will be structured along four integrative themes: 1) resources demand and efficiency; 2) natural capital stewardship; 3) land management; 4) net impact on global, EU and local scale (see section 1.3) and merging into thematic knowledge needs to satisfy the as yet unmet societal challenges and to ensure that knowledge contributes primarily to enable meeting these challenges. Based on these results, a cross-border and cross-discipline dialogue will subsequently be organized among the relevant user communities, funding bodies and scientific communities in Europe in order to reach a trans-national, prioritized SRA as well as a model for execution of this SRA. Thus a SRA will be produced which will give national funders confidence that for each Euro they spend, they will get multiple Euros worth of knowledge in return in order to address their national societal challenges.

Learn more about the INSPIRATION coordination and support action on the project's website: **www.inspiration-h2020.eu** and follow us on twitter: **@inspiration4eu**.

[1] The Swedish Geotechnical Institute (SGI) with support of Formas is currently mirroring the INSPIRATION approach in Sweden. SGI has proposed to act as Swedish National Focal Point and to become a full member of the INSPIRATION consortium. This has been welcomed by the consortium. Currently formal negotiations are in place between SGI, the consortium and the EC to effectively implement this collaboration. This report furthermore contains some information for Denmark and Luxemburg – representatives of both countries joined the Belgium workshop – and for the Republic of Ireland – representatives joined the UK workshop – see below.)

1.2 This deliverable

This report, i.e. “Deliverable 2.5 – National reports with a review and synthesis of the collated information” - integrates 17 national reports. These 17 countries, in alphabetical order, and the authors of these reports are (the NFPs for each country are in *italics*):

1. **Austria**,
   Pia Minixhofer, *Sophie Zechmeister-Boltenstern*, Rosemarie Stangl, Andreas Baumgarten, Martin Weigl, Peter Tramberend,
2. **Belgium** (including some information for **Denmark** and **Luxemburg**),
   Nele Bal, Bavo Peeters,
3. **Czech Republic**,
   Petr Klusáček, Stanislav Martinát, Bohumil Frantál,
4. **Finland**,
   Antti Rehunen, Teija Haavisto, Ritva Britschgi, Outi Pyy, Jari Rintala, Petri Shemeikka,
5. **France**,
   Marie-Christine Dictor, Samuel Coussy, Valérie Guerin, Corinne Merly,
6. **Germany**,
   Uwe Ferber, Stephan Bartke, Detlef Grimski,
7. **Italy**,
   Matteo Tabasso, Sarah Chiodi, Giulia Melis,
8. **Poland**,
   Anna Starzewska-Sikorska,
9. **Portugal**,
   Thomas Panagopoulos, Vera Ferreira, Dulce Antunes
10. **Romania**,
    Mihail Dumitru, Sorin Liviu Stefanescu, Andrei Vrinceanu, Valentina Voicu, Nicoleta Vrinceanu,
11. **Slovakia**,
    Maros Finka, Maria Kozova, Zita Izakovicova, Lubomir Jamecny, Vladimir Ondrejicka,
12. **Slovenia**,
    Boštjan Cotič, Barbara Mušič, Ina Šuklje Erjavec, Matej Nikšič,
13. **Spain**,
    Pierre Menger, *Gemma Garcia-Blanco*, Efren Feliu,
14. **Sweden**,
    Yvonne Ohlsson, Lisa van Well, Kerstin Konitzer,
15. **Switzerland**,
    Regula Brassel, *Marco Pütz*,
16. **The Netherlands**,
    Linda Maring, Jos Brils
17. **The United Kingdom** (including some information on **the Republic of Ireland**),
    Paul Nathanail, Matt Ashmore.

This report concludes the activities of INSPIRATION Work Package (WP) 2 "**Demands of research from industry, end-users and funders (State-of-the-art at national levels)**", task 2.5 "**Review and synthesis of the collated information**".

The WP2 activities were executed in the 1st year of the INSPIRATION project (month 1 – 12), i.e. in the period from March 2015 to February 2016. In the WP2 project description, the final task executed in this period is described in the following way:

> "*The NFPs will organize at national level a 2-day workshop, where the collated information (task 2.4) will be reviewed and synthesized and prioritized under guidance of the NFP by the NKSs. The WP-leader will prepare – in consultation with the INSPIRATION core group – a generic outline for the agenda of the 2-day national workshops. That outline will then be tailored to specific national situations by the NFPs. The results of the workshop – i.e. reviewed and synthesised information regarding topic a-d as mentioned under the WP2 objectives[2] – will be described in a national report (in English) by the NFPs. Before finalizing these reports, the NKSs as well as the International Advisory Board (IAB) will be given the opportunity to review the draft report. In these cases where English is not the native language, the national reports will also contain an executive summary (policy brief) of the report in the native language."* (INSPIRATION Grant Agreement - Description of Action - DoA).

This report describes the results of NKS interviews and of the desk-exercise as performed in participating countries aimed at collecting national research demands, science-policy-interface experiences and funding options. This report builds up on the interim results presented in Deliverable 2.4.[3] The methodologies followed for the information collation and synthesis are presented in more detail for each country below. In general, the following approach was applied (see also Figure 1):

1. In each country, national key stakeholders (NKS) have been identified (in a way to ensure broad representation of soil and land-use/management topics and affiliations in research funding / end-use / science or policy making);
2. Interviews (structured according to a common template: see Annex I and II) with circa 20 NKS per country have been conducted in order to collect national research needs as well as information on science-policy-interface and financing options (with interim result presented as D2.4);
3. In each country, a national workshop with NKS was conducted. Basis for the workshops was the input provided in the NKS interviews before the workshop. It was presented in order to synthesize the collated info, discuss and review the key national research topics. The workshop thus aimed to check, verify and enrich, and in some cases also already prioritize the suggestions provided by the NKS;[4]

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2 See section 1.5 for a description of topic a-d.

3 Brils, J. et al. (2015): National report on collated information following the template. Final version as of 01.12.2015 of deliverable 2.4 of the HORIZON 2020 project INSPIRATION. EC Grant agreement no: 642372, UBA: Dessau-Roßlau, Germany.

4 In several countries besides the NKS interviewed also more stakeholders were invited (i.e. it were open events), and participated and contributed to the workshops.

4. The results of the interviewing plus workshop process were documented in a report to become the respective final national reports. A draft version was to be send nationally to the NKS for review;
5. The national reports were aggregated in a combined document, on which the International Advisory Board (IAB) of INSPIRATION was asked to give feedback, too;
6. The D2.5 report has been finalised taking into account the IAB recommendations.

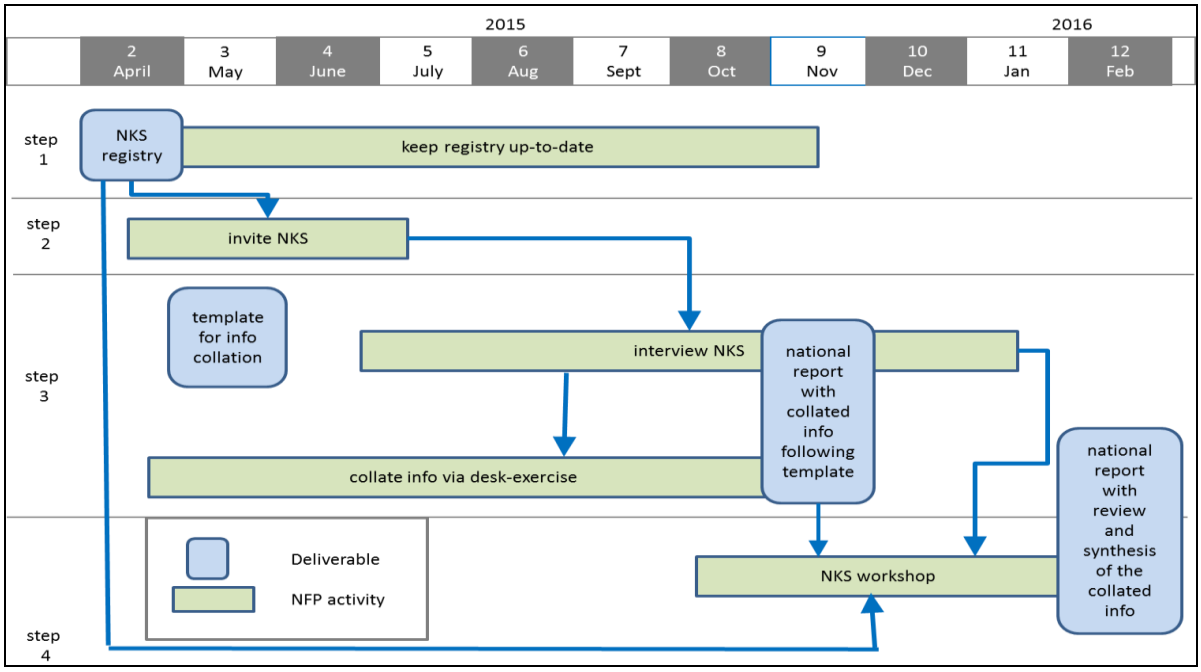


Figure 1: *INSPIRATION's WP2 workflow.*

As the engagement with the stakeholders and their review of the respective national reports collected in this document have been crucial in delivering a qualitative bottom-up overview of national research demands related to soil, land-use and land management in Europe, further details on the number and background of involved stakeholders is provided in section 1.4.

The information collated in this report feeds into WP3 "Transnational commons aggregated under integrated themes". According to the INSPIRATION DoA, the main objectives of WP3 will be to:

1. Achieve an overview of the transnational shared demands and experiences grouped under common themes based on the national state-of-the-art reports as produced by WP2,
2. Prioritise and elaborate the topics that could be included in the SRA (to be developed by WP4) under specific themes,
3. Elucidate the opportunity to match (to be done under WP4) individual stakeholders (as funders) to specific SRA topics that could be shared transnationally." (INSPIRATION Grant Agreement - Description of Action - DoA).

Visit the INSPIRATION website for the up-coming deliverables of the network!

1.3 The INSPIRATION conceptual model and its themes

In order to identify cross-country and cross-sectorial knowledge gaps and research questions, the national Research and Innovation (R&I) needs will be analysed along four overarching themes identified in the INSPIRATION conceptual model. This model is presented in figure 2. It has been used to structure the information presented in this report on R&I needs following these guiding key-questions for each theme:

- **Demand**:
  What does society demand from natural capital and ecosystem services including the SSW-system?
- **Natural capital**:
  What has nature, including the Soil-Sediment-Water (SSW)-system, to offer and which determinants sustain the system?
- **Land management**:
  What are options for an integrated, cross-sectorial land management to balance societal demands and natural capital?
- **Net-impacts**:
  What are the impacts of different options of managing natural capital, including the SSW-system on global, regional and local as well as temporal scales?

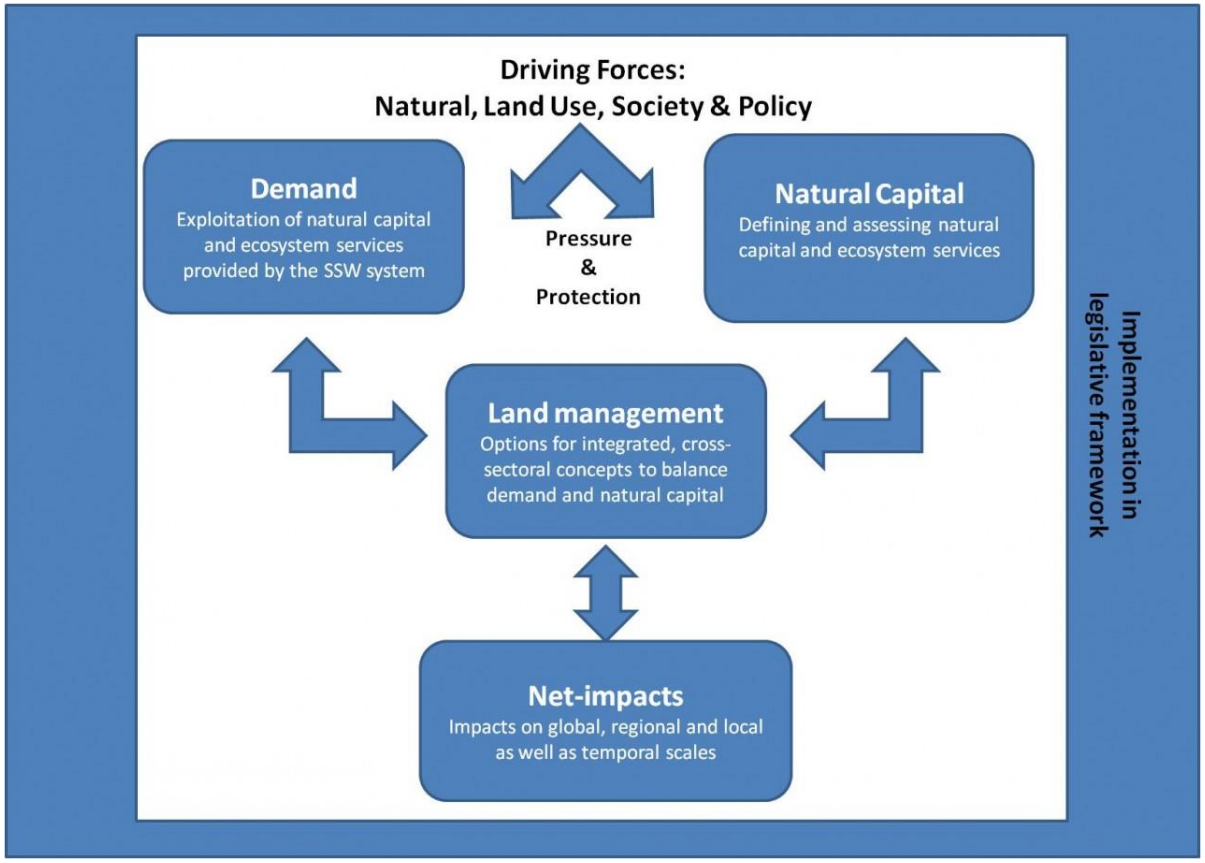


Figure 2: *INSPIRATION's conceptual model.*

1.4 Overview on engagement with National Key Stakeholders

Under lead of the NFPs (see section 1.2), in each country a selected group of National Key Stakeholders (NKS) have been contacted and interviewed in order to collate the information needed for being able to achieve the objectives of WP2. These selected groups of NKS (approx. 20 per country) represent for each country a balanced distribution of stakeholders deriving from the research funding and industry/business communities (including SMEs), the scientific, consultancy, policy-making, management arena as well as NGOs. Thus, it is a mix of knowledge 'producers', 'consumers/end-users' and 'funders' (cf. also deliverable 2.3)[5].

In total:

- **374 individual NKS were interviewed, and**
- **468 individuals participated in the national workshops.**

The following figures present some statistics in order to provide further insights on the background of the interviewed NKS and on the workshop participants:

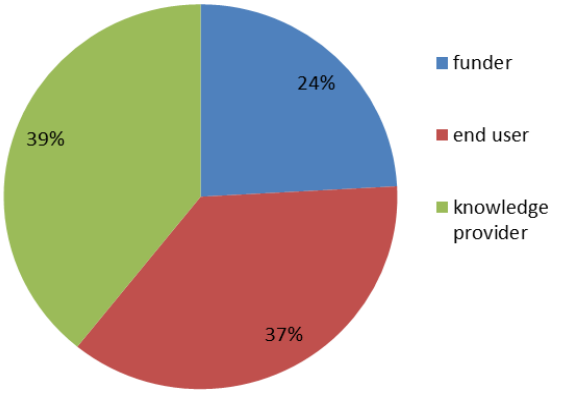
Overall (all INSPIRATION countries pooled together):

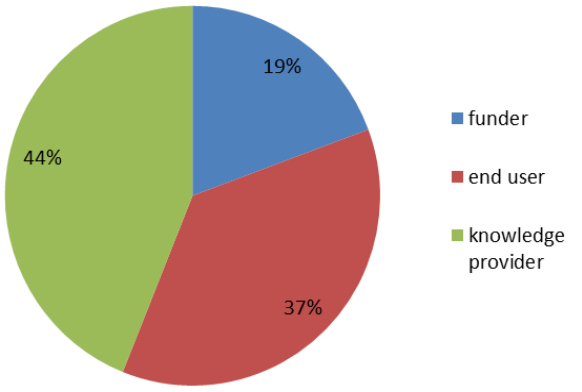
- Figure 3: Division "funders / end-users / knowledge providers",
- Figure 4: Interviewed NKS and workshop attendees per stakeholder category,
- Figure 5: Interviewed NKS and workshop attendees per expertise domain,

Per county (countries presented individually besides each other in one graph):

- Figure 6: Individuals participating in the interviews and workshops,
- Figure 7: Division of "funders / end-users / knowledge providers",
- Figure 8: Division in stakeholder categories,
- Figure 9: Division per expertise domain.

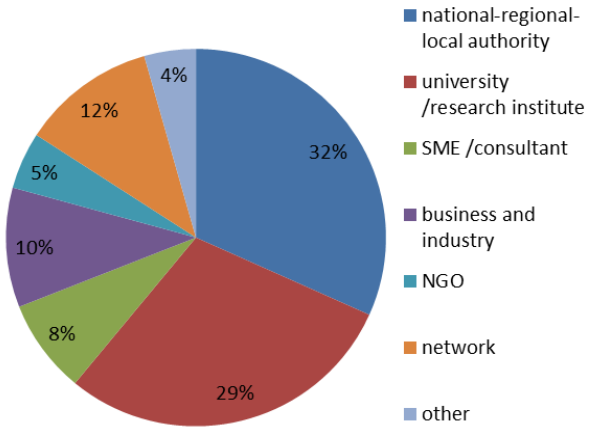
[5] Maring L, Ferber U, Dictor MC, Starzewska-Sikorska A, Klusáþek P, Panagopoulos T, Bal N, Tabasso M, Cotiþ B, Nathanail P, Garcia G, Pütz M, Finka M, Zechmeister-Boltenstern S, Dumitru M, Rehunen A, Brils J (2015): Registry of National Key Stakeholders cooperating in INSPIRATION. Update 1 version as of 30.06.2015 of deliverable D2.2 of the HORIZON 2020 project INSPIRATION. EC Grant agreement no: 642372, UBA: Dessau-Roßlau, Germany.

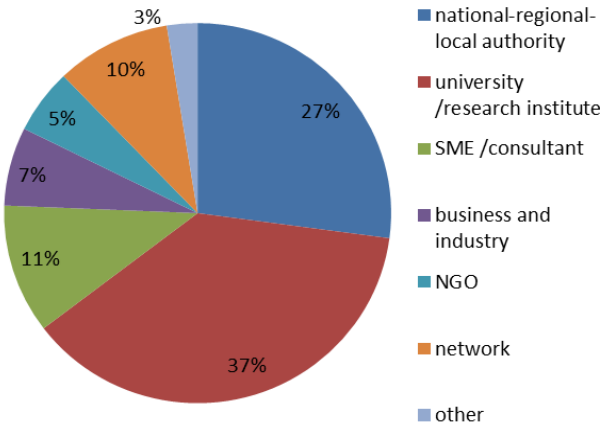




***a**: interviewed NKS (total 374)* ***b**: workshop attendees (468)*

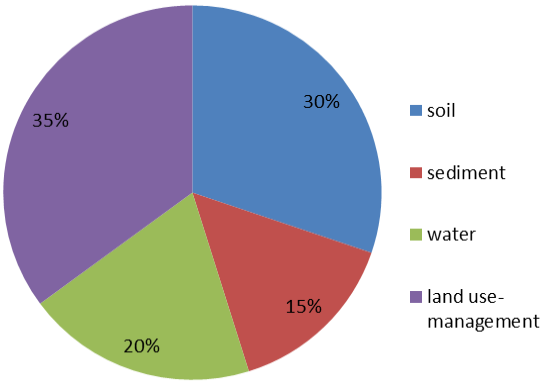
***Figure 3**: Division "funders / end-users / knowledge providers".*

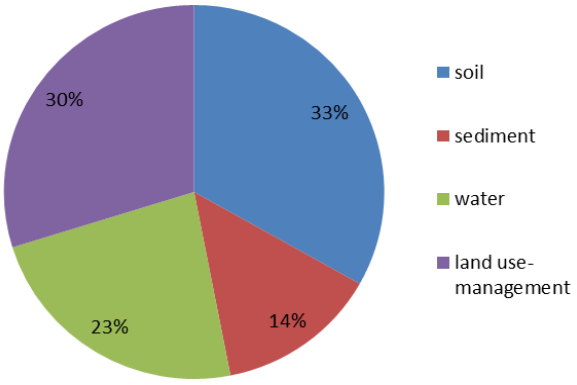




***a**: interviewed NKS (total 374)* ***b**: workshop attendees (468)*

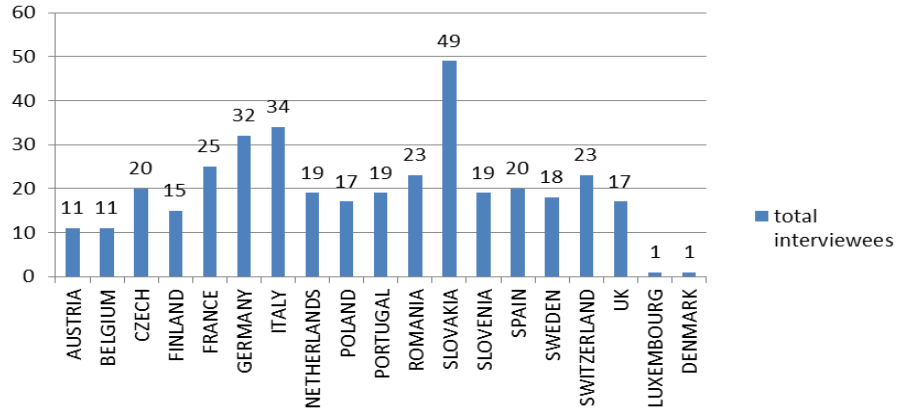
***Figure 4**: Interviewed NKS and workshop attendees per stakeholder category.*



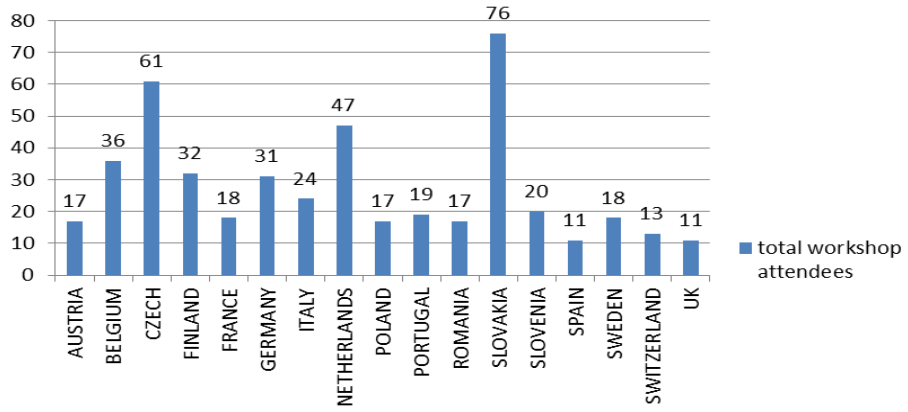


***a**: interviewed NKS (total 438)* ***b**: workshop attendees (468)*

***Figure 5**: Interviewed NKS and workshop attendees per expertise domain.*

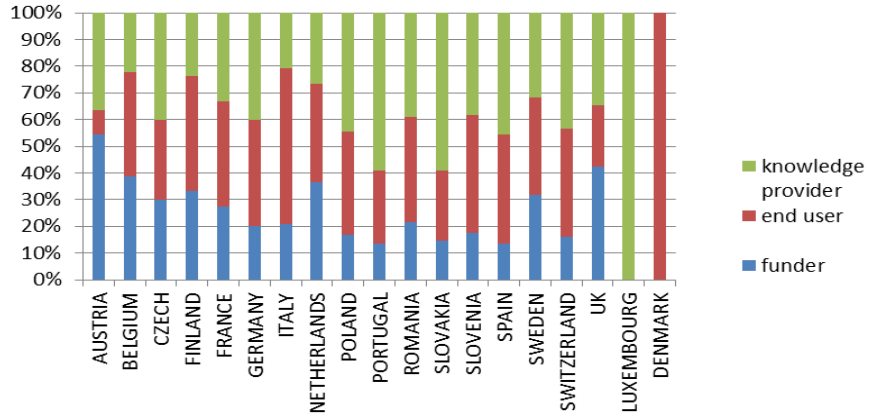


***a**: interviewed NKS*

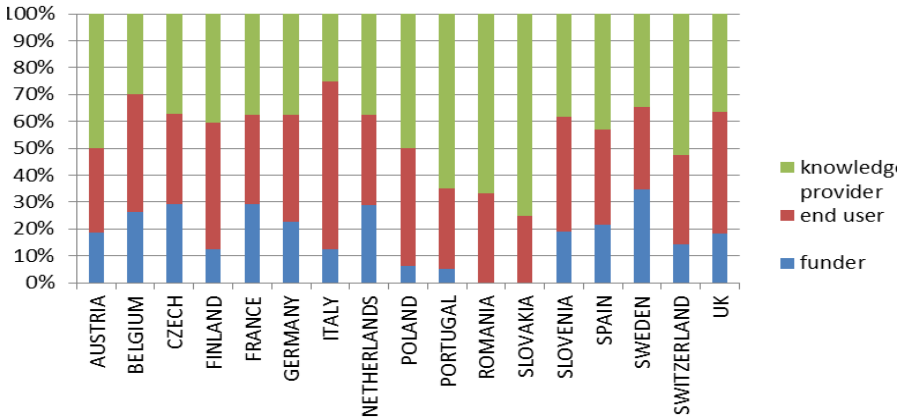


***b**: workshop attendees*

***Figure 6**: Individuals participating in the interviews and workshops.*

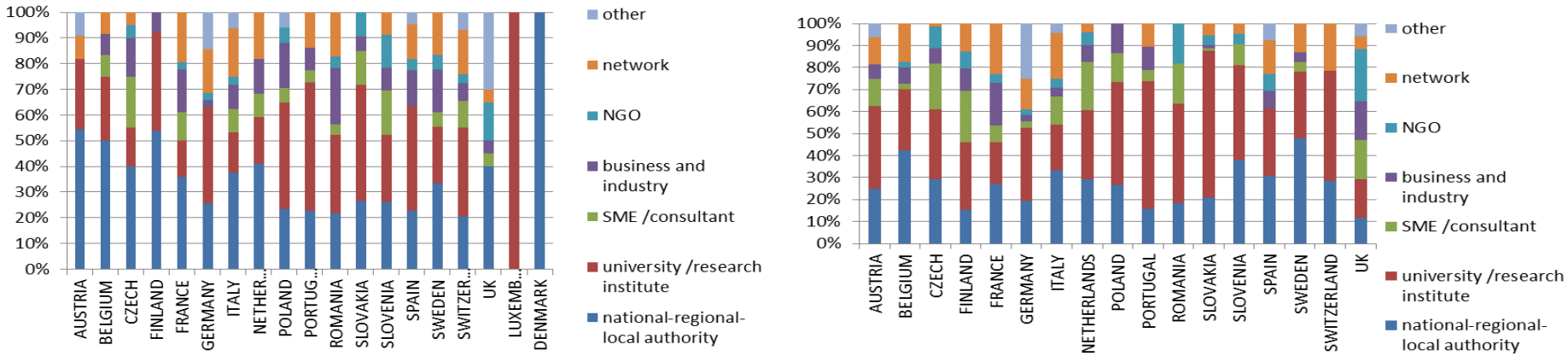


***a**: interviewed NKS*



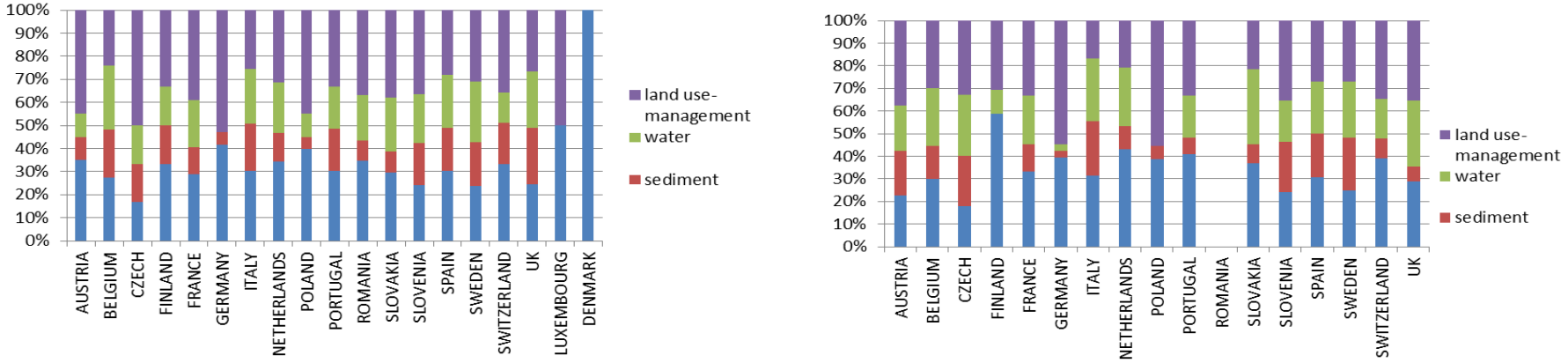
***b**: workshop attendees*

***Figure 7**: Division of "funders / end-users / knowledge providers".*



***a**: interviewed NKS* ***b**: workshop attendees*

***Figure 8:** Division in stakeholder categories.*



***a**: interviewed NKS* ***b**: workshop attendees*

***Figure 9:** Division per expertise domain.*

1.5 Guide to the reader: outline of the country chapters

Each subsequent chapter in this report presents the findings for a single country. In general, these chapters follow a comparable outline:

Section X.1- Executive summary

This section provides an executive summary in English (X.1.1) as well as in the national language (X.1.2).

Section X.2 - Methodology followed

This section describes the methodology followed in the respective country including information on the stakeholder engagement (see also section 1.4).

The subsequent sections give a review and synthesis of the main results of the topics as mentioned under the WP2 objectives (see section 1.2).

Section X.3 Research and Innovation (R&I) needs

- ***Topic a:*** ***Demand-driven***** suggestions for the Strategic Research Agenda (SRA), i.e. suggestions from the perspective of industry, end-users and funders.*
  Related key question to be answered: ***What (new) knowledge do these parties need to tackle societal challenges including the increase of job opportunities)?***

* ***Demand-driven*** *in INSPIRATION means focusing on the demands of those who are responsible or feel committed to tackle the societal challenges related to the INSPIRATION scope and themes, i.e. industry, end-users and funders. These parties could improve their business opportunities and/or take better informed decisions on what measures to take and execute in order to tackle other societal challenges if they would (be enabled to) use the knowledge as resulting from execution of the INSPIRATION SRA.*

This section is divided in the sub-sections:

- Societal challenges and needs (X.3.1);
- Topics / research needs to include in the SRA (X.3.2).

The research questions under the topics in the X.3.2 sub-sections are divided by themes of the INSPIRATION conceptual model as described in section 1.3 of this chapter.

Section X.4 - Experiences regarding connecting science to policy/practice

- ***Topic b:*** *Experiences regarding the exploitation of scientific knowledge to improve business opportunities and/or tackle other societal challenges.*
  Related key question to be answered: ***Where to improve the science-policy interface so that (new) knowledge can and will be more effectively exploited by the demand side?***

This section is divided in the sub-sections:

- Use of knowledge (X.4.1);
- Possibilities to set the agenda (X.4.2);
- Science – policy – practice (X.4.3).

Section X.5 National and transnational funding schemes

- ***Topic c:*** *Predominant, current as well as promising alternative funding schemes / mechanisms / programs for knowledge production and dissemination.*
  Related key question to be answered: ***How to get with one Euro of national/regional funding a multitude of Euro's (from all sources) worth of knowledge in return contributing to EU and national demands? Or even how to get with one euro of EU funding a multitude of euro's (from national, regional, local, and private sector) worth of knowledge in return contributing to the R&I demands on Land and the Soil-Sediment-Water systems.***
- ***Topic d:*** *Experiences regarding the use of any trans-national, common budget for scientific knowledge production related to the scope of INSPIRATION.*
  Related key question to be answered: How to set up/govern the appropriate funding option(s) resulting from INSPIRATION – based on previous learning experiences – so that: (1)the above demands will be fulfilled, (2) knowledge resulting from implementation of the SRA will be taken up and used and (3) funders experience that their invested, national Euros are indeed multiplied?"

This section is divided in the sub-sections:

- Funding schemes and possibilities for research funding (X.5.1);
- Gaps in financial resources for research (X.5.2).

Section X.6 - Other remarks made by interviewees

This section is optional and is not taken up in all national reports. It contains remarks, points of attention and recommendations for INSPIRATION as given by the NKS.

1.6 Annexes

Annex I: NKS questionnaire template

This is the updated version of the questionnaire - reflecting inputs from the IAB and discussions at the NFP training in Vienna on 22nd – 23rd June 2015.

Note: this questionnaire template is meant to help National Focal Points (NFPs) to facilitate the interview/conversation with the National Key Stakeholders (NKS). Some questions are relevant to one NKS, other questions to another NKS. Hence, not all questions are relevant to each single NKS. The NFPs are required to adapt the template accordingly – keeping in it as many as possible of the issues to be addressed. If needed, the NFPs also translate the questionnaire into their national language.

The questionnaire (see next pages) has the following outline:

A. **Interview information:**
   To be filled out by the interviewer

B. **Introduction:**
   That the interviewer can use to start the NKS interview

C. **Background information of the NKS interviewed:**
   Mostly 'tick-boxes'

D. **Strategic Research Agenda (SRA):**
   NKS preferred topics, overarching themes and scope for the SRA and national state-of-the-art on research agendas that the NKS is aware of

E. **Science-Policy-Interface:**
   NKS experiences regarding the exploitation of scientific knowledge to: improve business opportunities; tackle other societal challenges; assist policy-implementation and/or policy revision

F. **Funding:**
   Predominantly used as well as promising alternative funding schemes / mechanisms / programs for knowledge production and dissemination that the NKS is aware of

G. **Other:**
   At the end there is some time advised to let the NKS give us their advice, some nice quotes (that we can use anonymously in our communications), examples etc.

H. **Ending the interview:**
   Explain follow up and if/how NKSs will be involved in the next steps of INSPIRATION

Questionnaire template

A. Interview information
Country: Name of INSPIRATION researcher: Date of Interview: How does the NKS wish to be referred to: *[Anonymous, personal opinions, company's opinion. Choose when it is a good time to discuss this. In the beginning or later on.* *SHOW the interviewed NKS the ENGAGEMENT CONSENT FORM and ask him/her to fill it out. Please introduce the engagement consent form (available in 'D2.1 MoU' and editable by yourself) and hand a copy to the interviewee to read and fill in – make sure that you take this away with you and keep for your own records]*
B. Introductions
[Please introduce your selves, the project and the purpose of the interview. You can use the handout as provided at the end of this template. This can also be sent beforehand to the NKS. Agree on a time span: approximately one and a half hour.]
C. Background information on the interviewee
1. Name of NKS interviewed: 2. Institution: 3. Role:
4. Are you a (multiple answers possible): ○ National-regional-local authority ○ University/research institute ○ Small or Medium sized Enterprise (SME, i.e. < 500 employees) / consultant ○ Business and industry ○ Non-Governmental Organisation (NGO) ○ Network representative / leader ○ Other, specify: …
5. Fields of expertise (multiple answers possible): *[Ask to specify background regarding the selected item(s) in order to understand expertise background of interviewee]* ○ Soil ○ Water ○ Sediment ○ Urban / spatial planning ○ Landscape design ○ Land management ○ Other, specify: …..

6. Does your organisation provide external research funding?
   - ○ Yes. Please specify: ...
     [e.g. as programme holder, public, private, …]
   - ○ No

D. SRA

7. Which societal challenges do you regard as important?

   [*If needed, you can use the European Commissions (EC) list of societal challenges here. These EC themes are*:]

   - Contribute to food security and food safety;
   - Ensure secure supplies of safe drinking water;
   - Secure energy supply and distribution;
   - Reduce raw material and resource consumption, Ensure efficient use of natural resources;
   - Contribute to climate change mitigation and societal adaptation;
   - Contribute to a healthy living environment;
   - Ensure secure infrastructure

   [Explain that these challenges may be used as bases for defining of the overarching themes for aggregating the research topics of our SRA.]

   a. If applicable, what additional, other or alternative challenges would you suggest/prefer?

   [When needed, you can mention challenges as nature conservation, sustainable use of ecosystem services, halting the loss of biodiversity]

8. Starting with your own experience: which <u>specific topics</u> (research needs) should be included in the SRA?

   [For each single topic mentioned by the NKS, use the following follow-up questions. The a, b and c sub-questions are mandatory. The other sub-questions are optional]:

   a. Explain – elaborate the topic
      - *Who will be affected?*
      - *Who is responsible?*
      - *Is it a topic of concern of your organisation / department*
      - *Is it only a national topic, or a shared topic by multiple countries?*
      - *Where are we now, where do we want to be in x years (point on the horizon)?*
      - *How can the newly gained knowledge be effectively used?*

   b. Priority:
      1. *High priority*
      2. *Some priority*
      3. *Neutral priority*
      4. *Low priority*
      5. *No priority*

      - What is the urgency, i.e. what goes wrong if we do nothing?

c. Who wants to/should fund this kind of research?

[Optionally: check the following WP3 key-words for relevance, i.e. if they raise any additional topics by the NKS. The key-words can be used as support / check list

Be sensible as interviewer if this is needed.]

- *Assessment of land resources*
- *Potential productivity of land and soils*
- *Demand for soil/land resources, imports and exports*
- *Competition between land uses (land-use conflicts)*
- *Concepts to identify and quantify relevant impacts*
- *Instruments to avoid / minimize impacts (feedback to decision-making process)*
- *Opportunities of innovative land-use technologies*
- *Resource-oriented land management systems]*
- *Soil regeneration*
- *Soil and groundwater remediation*

9. Linked to topics mentioned by the NKS:

   a. What are the important / relevant documents, research agendas, research programmes underpinning these topics? (state-of-the-art)

   b. Related to these agendas and programmes: what are timelines of programming and windows-of-opportunities to influence agendas / programmes?

   [Note: question 9b is input for work package 5]

E. Science-Policy-Interfacing (SPI)

10. How would you define 'scientific knowledge'?

11. For what do you use scientific knowledge in your job?

12. Which sources of (scientific) knowledge do you use for doing your job?

[Open question and you can mention some of the sources underneath as examples]

- *scientific paper*
- *consultants*
- *reports*
- *colleagues*
- *experiences /examples within my own country*
- *experiences /examples abroad*
- *newspapers*
- *television*
- *conferences Involvement in research projects*
- *data (bases)*
- *websites, such as: …..*
- *other, specify: …..*

13. To what extent do you use most recent/new scientific knowledge (i.e. state-of-the-art scientific insights/findings) for doing your job?

14. To what extent are you able to influence (and how) the setting of scientific research policies/agendas in our country?

15. To which extent do our national policies/agendas reflect your specific needs and priorities?

16. To what extent has been made use of the state-of-the art in scientific research for the formulation of existing policies in our country?

[Questions only for NKS from the non-science sector (business and policy):]

17. Have you ever been involved in:

    a. the formulation of scientific research questions?
    b. doing scientific research (i.e. knowledge co-creation)?
    c. synthesizing/wrapping-up of scientific knowledge, e.g. to feed into policy making or to increase business opportunities?

[When yes: Follow-up questions]

- How successful/satisfying was this, on a scale of 1-5?
  1. *Very successful/satisfying*
  2. *Successful /satisfying*
  3. *Neutral*
  4. *Unsuccessful/unsatisfying*
  5. *Very unsuccessful/unsatisfying*
- What went well
- What could be improved?
- What to avoid/not to do?
- Additional remarks?

[Question only to NKS who are likely to have insights here (e.g. research funders)]

18. (How) is the societal impact of scientific research related to the scope of INSPIRATION being assessed in our country?

[If they know: Follow-up questions:]

- How successful/satisfying is this, on a scale of 1-5?
  1. *Very successful/satisfying*
  2. *Successful/satisfying*
  3. *Neutral*
  4. *Unsuccessful/unsatisfying*
  5. *Very unsuccessful/unsatisfying*
- What indictors are used?
- What goes well?
- What can be improved?
- What to avoid/not to do?
- Additional remarks?

19. Which national Science-Policy-Interface documents do you know of / can you recommend?

F. Funding

20. Which experiences and expectations in funding schemes (public / private) do you have in your own field that could offer opportunities for future research on land-use and -management and related impacts to Soil-/Sediment-/Water-systems:

    - Sub-nationally/regionally?
    - Nationally?
    - European? [*e.g. H2020, Interreg, multi-lateral such as the Joint Programming Initiatives*]
    - International? [*e.g. Belmont Forum, Foundations.*]

    [For all R&I questions aiming at achieving policy targets in the Land & SSW related system (like e.g. Sustainable Development Goals on soils, existing EU directives such as the Environmental Liability Directive, etc.) consider all Public and Private funding sources. Please ask to provide details and give most important references (documents, website) that could be relevant for explaining the answer]

21. How to increase the added value of different financial resources (i.e. achieve a multiplier) for doing research that contributes to EU and national demands, in particular to the R&I demands on Land and the SSW-system?
    [*CONSTRUCTIONS that (could) work. PP, PPI, etc. Just ask for, as open as possible for suggestions, ideas, experiences, good examples*]

22. Are there areas of research and innovation (R&I) that you are aware of that are not (yet) covered by current funding mechanisms and which would need new/different funding schemes / infrastructures?

23. Integrated approaches (necessary for addressing particular societal challenges related to the use and management of land and related impacts to SSW systems) are usually difficult to fund / get recognized by the research funding communities. What would be necessary to improve this?

24. Based on previous learning experiences that you are aware of: how to best set up / govern funding option(s), so that societal demands will be fulfilled, knowledge resulting from execution of the SRA will be taken up and used; and funders experience that their invested, national Euros are indeed multiplied? *[if they know: follow-up questions]*

- How successful/satisfying was this, on a scale of 1-5?
    1. *Very successful/satisfying*
    2. *Successful/satisfying*
    3. *Neutral*
    4. *Unsuccessful/unsatisfying*
    5. *Very unsuccessful/unsatisfying*
- What went well?
- What could be improved?
- What to avoid/not to do?
- Additional remarks?

G. Other (remarks, suggestions, examples):

H. Ending the interview

Thank you for taking the time to participate in this interview:

- Would you like us to keep you updated about INSPIRATION progress?
- Would you suggest anyone else who we should be interviewed by us?
- Do you have further questions arising from this interview, or would you like to add anything else?
- What information are you interested in, and willing to give feedback on?

  [Discuss the feedback mechanism and if they have expressed their opinions as a person or as a representative of their organisation/network. Checklist:]

  a. Information to exchange / willingness to give feedback on:

  - (complete interview, not recommended)
  - summary of main conclusions
  - national report, national contribution to D2.4
  - complete D2.4, all countries

  b. Preferred level of feedback:

  - no feedback
  - informal feedback
  - formal feedback (e.g. on behalf of represented organisation)

[Check: have you discussed consent form / how to refer to interviewee]

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Annex II: NKS hand-out: INSPIRATION interview at a glance

INSPIRATION interview at a glance

Aim of INSPIRATION:

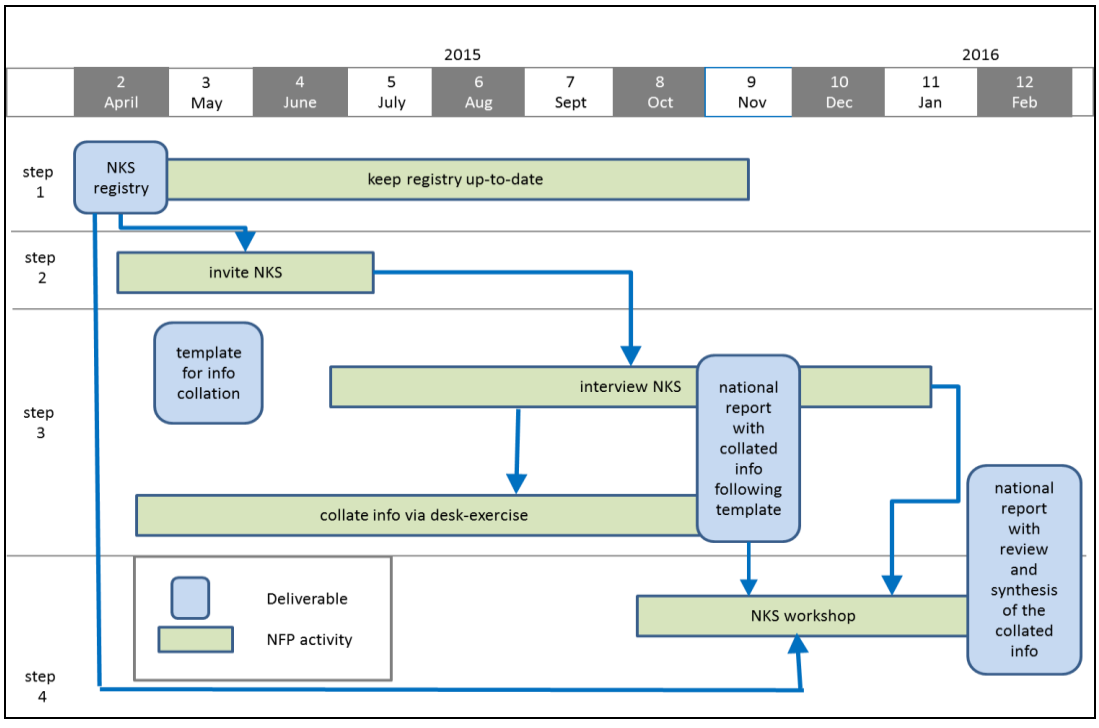
The main purpose of the EC-funded INSPIRATION project is to formulate an end-user driven strategic research agenda (SRA) for land-use, land-use changes and the related, impacted compartments of the Soil-Sediment-Water (SSW) system in order to meet current and future societal challenges and needs. Next to that, the project aims to scope out models of implementing the SRA and to prepare a network of public and private funding institutions willing to commonly fund the execution of the SRA.

National Key Stakeholders (NKS):

In a series of NKS interviews across EU nations the "National Focal Points (NFP) gather for nations individually information related to the INSPIRATION scope (land and SSW-system use and management) on:

- Research and Innovation (R&I) needs
- Experiences regarding connecting science to policy/practice
- National and transnational funding schemes

In the interviews we focus at NKS – like you – positioned at a strategic level, i.e. leading persons in their field of profession; with a good overview on opportunities; a clear vision on, and insight in knowledge demands (short, middle and long-term). Furthermore, these NKS are well positioned and participate in relevant professional network(s) and may also have potential to become an ambassador for INSPIRATION. We selected NKS to represent different disciplines and institutional backgrounds including: land-use planners; managers; soil, sediment and water experts; researchers, funders and regulators/policy makers.



Workflow in the first year of INSPIRATION

This interview:

Collecting input from you – an expert in your field – is crucial for the project in order to help us describing the state-of-the-art in our country as input into the European research agenda. In the interview we will go through a series of topics and questions: The interviews of NKS (ca. 20 per nation), together with a desk study on research needs and funding possibilities will be synthesized to a 'national report'. This synthesis will be reviewed in a national workshop, to prioritize the topics for the suggested Strategic Research Agenda (SRA) from our country's point of view. The national reports will finally be used as input for elaborating the European SRA and cross-nation matchmaking (matching research needs to possible funding).

Example questions:

Research and Innovation (R&I) needs

- Which societal challenges do you regard as important?
- Starting with your own experience: which specific topics (research needs) should be included in the SRA?

Experiences regarding connecting science to policy/practice

- How would you define 'scientific knowledge'?
- To what extent has been made use of the state-of-the art in scientific research for the formulation of existing policies in our country?

National and transnational funding schemes

- Does your organisation provide external research funding?
- Which experiences and expectations in funding schemes (public / private) do you have in your own field that could offer opportunities for future research on land-use and -management and related impacts to Soil-/Sediment-/Water-systems

Your benefits from participating:

- A chance to influence the European SRA on land and SSW management in the light of societal challenges and needs;
- Being able to make use of the results of the project: overview of research need and of existing and promising funding schemes on different levels (sub-national, national, European, international) and opportunities for a better connection between science and policy/practice;
- Use the matchmaking opportunity to get in contact with other networks in- and outside our country, and countries learn which shared challenges can be taken up jointly.

Contact and further information:

For general information on the INSPIRATION project visit our website: www.inspiration-h2020.eu

Contact the National Focal Point:	Contact the general project coordination:
See the INSPIRATION website for contacts	Stephan Bartke stephan.bartke@uba.de

2. Austria

Report by Pia Minixhofer, Sophie Zechmeister-Boltenstern, Rosemarie Stangl, Andreas Baumgarten, Martin Weigl, Peter Tramberend

2.1 Executive Summary

2.1.1 English version

Sustainable land use and soil management is an urgent topic in light of climate change and finite soil resources. The same area can potentially fulfil a high variety of needs. It is essential to prioritise and adapt to changing societal and environmental conditions. Therefore, the EU societal challenges should be seen as equally important.

Austria is a country with high environmental standards. However, at the moment, awareness of soil protection and sustainable spatial planning is not achieved on a satisfying level neither in Austrian politics, nor in the general public. This is astounding as in mountainous countries fertile soil is particularly scarce and valuable. A national agenda specific to the scope of INSPIRATION is not known for Austria. It is very difficult to protect soil and land nationwide with the current jurisdiction. Due to the principle of separation of competences, laws and regulations for soil and spatial planning are in the responsibilities of the counties and not of the state. To obscure the problem even further, a distinct gap exists between the conception of soil in spatial planning and in soil sciences, as soil quality is not a recognized factor in spatial planning. The lack of uniform laws inhibits the possibility to regulate soil and land use consistently and secure co-operation over all levels.

Overarching funding schemes are generally missing. Currently, research agendas are mostly disciplinary, societal challenges are only tackled on a short term basis and many long-term projects have reduced financial support. The current financing and funding systems are adverse to innovation, policy needs and sustainable implementation.

Research and Innovation Needs

The participants of the Austrian workshop conclude that there is a significant discrepancy between basic and applied research, which leads to a gap between science and civil society. Decision-makers are focussed on the implementation of scientific findings, whereas research experts are mostly oriented on analytical and methodological aspects. However, implementation research alone will neither be sufficient nor realistic. Researchers have to be able to explore research questions on the basis of their expertise without the pressure of implementation and societal benefit.

Future research questions should tackle ways of sustainable land management, its contribution to food security, re-cultivation of abandoned areas, demographic changes and its implications for e.g. urban sprawl or infrastructure, digitalisation possibilities, methods to address natural hazards, protection of soil and landscape diversity, Alpine concerns, public participation, political regulations and involvement and impact assessment of project implementation. A high potential for the alignment of existing knowledge is apparent. Consolidation of knowledge should happen in light of cultural differences.

Science-Policy-Interface

Scientific research policies cannot be influenced easily without political support. However, the opportunities for researchers to influence political decision-making are rather scarce. To approach wide acceptance and secure best multiplication, it is critical to involve the civil society and all stakeholders (e.g. spatial planners, soil scientists, society, land owners, politicians) as early as possible and to keep them involved throughout the project period.

Participation of relevant stakeholders would lead to long-term partnerships and implemented research results. The dialogue between scientific and policy-making communities needs to be strengthened, to improve linkages between policy needs and research programmes, as well as to enhance the accessibility of scientific knowledge to policy makers. It is of key importance to provide information for the non-science community in an understandable language and to foster open communication. Research results could be a viable input for municipality regulations and sustainable municipality development. A summary of best practice examples could show the public successful research implementations. Many SPI documents would already be available, but are not brought to the attention of relevant stakeholders.

In Austria, adequate tools are needed to assess the environmental impact of land and soil use, successful project implementation, added value or societal impact of research projects. A uniform assessment would be a necessary prerequisite for the development and establishment of indicators, which would make political goals reasonable and could function as communication tool for the public. Demonstration of consequential costs of land use changes have to be one of the main outcomes of research projects.

In particular with regard to soil topics and land management, long-term projects, monitoring programs and socio-political topics, there is a clear need for strengthened action and de-bureaucratisation. The merger of regional administrations could simplify old, complex structures, but the political resistance would be tremendous. Re-zoning of green land could be losing attractiveness with financial benefits for resource-saving measures or restriction of intervention possibilities for municipalities (e.g. the spatial planning laws of the counties).

Funding

The Austrian workshop participants see a distinct need for new structures of the call process and the implementation of new research projects and programs. This would be necessary to secure sustainable success, avoid parallel research and reduce implementation deficits. In order to reinforce the added value of different financial resources (for EU and national demands), researchers, funders and questioners should establish a clear structured and transparent research platform for a wide range of topics about soil and spatial planning. Network building and the elimination of fragmentation would increase the added value of financial resources and improve the knowledge transfer. Funders will experience that their invested, national Euros are indeed multiplied, when (1) inter-/trans-disciplinary approaches, (2) applied research as well as (3) local issues are considered.

According to the Austrian workshop participants, funding programs and schemes should include (1) goal orientation and practicability, (2) a committed budget for communication, awareness raising and participation, (3) focus on implementation, (4) a clear definition of the market stakeholders in their socio-political role in the relevant time frame, (5) assessment and evaluation of the social impact and added value and (6) interconnection of the funding schemes.

The setting of scientific research policies/agendas can only be influenced with the allocation of budget for certain research projects, in raising questions to the administration, within and via expert committees, and through co-operation with research institutions. Co-funding, private sector companies and initiatives should be integrated.

2.1.2 German version

Nachhaltiges Flächen- und Bodenmanagement ist in Zeiten des Klimawandels und endlicher Bodenressourcen auch in Österreich ein dringendes Thema. Theoretisch kann dieselbe Fläche verschiedenste Bedürfnisse erfüllen. Dafür sind jedoch das Setzen von Prioritäten und die Anpassung an sich verändernde soziale Bedingungen und an die Umwelt erforderlich, und die großen gesellschaftlichen Herausforderungen der EU sollten als gleichwertige Basis betrachtet werden.

Österreich ist ein Land mit hohen Umweltstandards. Trotzdem ist weder in der Politik noch in der Bevölkerung ein breites Bewusstsein zu den Themen Bodenschutz und nachhaltige Raumplanung vorhanden. Das ist insofern verwunderlich, da in Gebirgsregionen fruchtbarer Boden besonders rar und wertvoll ist. Eine nationale Agenda zum Thema von INSPIRATION gibt es in Österreich nicht. Unter der momentanen Gesetzeslage ist es in Österreich besonders schwierig, Boden und Land national zu schützen. Auf Grund der Kompetenzteilung sind Gesetze und Richtlinien zu Boden und Raumplanung dezentral und Aufgabe der Länder und nicht des Bundes. Das Problem wird noch weiter verschärft, da Boden in Raumplanung und Bodenwissenschaften unterschiedlich beurteilt wird. Die Bodenqualität spielte in der Raumplanung bislang keine Rolle. Das Fehlen einheitlicher Gesetze verhindert eine einheitliche Beurteilung und Regulierung von Boden- und Flächenverbrauch sowie eine überregionale Zusammenarbeit.

Übergeordnete Forschungsförderungskonzepte für Boden- und Raumplanung gibt es in Österreich grundsätzlich keine. Derzeit sind Forschungsagenden zumeist disziplinär, gesellschaftliche Herausforderungen werden nur kurzfristig behandelt und viele Langzeitforschungsprojekte werden aufgrund mangelnder Finanzierung reduziert oder eingestellt. Das momentane Finanzierungs- und Fördersystem auf diesem Gebiet ist für zukunftsweisende Innovation, politischen Bedarf und nachhaltiger Umsetzung nicht ausreichend.

Forschungs- und Innovationsbedarf

Die Workshop-TeilnehmerInnen sehen eine Diskrepanz zwischen Grundlagenforschung und angewandter Forschung, die zu einer Kluft zwischen Wissenschaft und Zivilgesellschaft führt. Die Teilnehmenden finden, dass Forschung im Bereich Boden und Raumplanung vermehrt Umsetzungsorientierung braucht. Mit einem partizipativen Ansatz in der Forschung können Stakeholder besser integriert und langfristige Partnerschaften aufgebaut werden. Integrative und partizipative Forschung ermögliche es, gesellschaftliche Probleme an die Wissenschaft heranzubringen. Zuerst sollten die gesellschaftlichen Probleme identifiziert, bestehendes Wissen konsolidiert und gleichzeitig oder danach die konkreten Forschungs- und Innovationsanforderungen definiert werden, damit eine sinnvolle Umsetzung noch zeitnah geschehen könnte. Der nachhaltige Erfolg von implementierten Forschungsprojekten und gesetzten Maßnahmen müsse evaluiert werden. Geeignete Indikatoren und Regelwerke müssen zunächst entwickelt und dann angewandt werden.

Es müsse Aufgabe der Forschung sein zu zeigen, wie die Rahmenbedingungen für eine nachhaltige Landnutzung geändert werden können. Die Wissenschaft ist mehr als bisher gefordert, auch auf neue, situationsbedingte Fragestellungen relativ rasch Antworten zu finden, die für die Praxis relevant und anwendbar sind. Neben der Umsetzungsforschung sollte aber auch so genannte „Blue Skies Research“, dh. riskante Bottom-Up Forschung zu neuartigen Themen mit hohem Innovationsgrad, möglich sein. Zukünftige Forschungsthemen sollten sich mit folgenden Fragestellungen befassen: nachhaltige Landnutzung, ihr Beitrag zur Ernährungssicherheit, Rekultivierung von degradierten Flächen, demographische Veränderungen und deren Auswirkungen auf z.B. Zersiedelung und Infrastruktur, Innovation durch Digitalisierung, Naturgefahren, Schutz der Biodiversität, Strukturen im Alpinen Raum, öffentliche Partizipation, politische Rahmenbedingungen sowie Evaluierung der Auswirkungen von Projektumsetzungen.

Die Politik benötige fundiertes Wissen, um den gesellschaftlichen Druck auf Böden zu reduzieren. Die teilnehmenden ExpertInnen betonen, dass es essentiell sei, wissenschaftliche Ergebnisse der Öffentlichkeit und Politik verständlicher zu kommunizieren. In Österreich erwartet man sich dadurch, z.B. die Problematik der Flächenumwidmungen nachhaltiger lösen zu können. Bewusstseinsbildung sei zu verstärken und das Aufzeigen der Folgekosten bei Landnutzungsänderungen müsse verständlicher kommuniziert werden.

Die politischen EntscheidungsträgerInnen auf lokaler Ebene müssen konkret einbezogen werden, um die Umsetzung von Forschungsergebnissen sicher zu stellen. Idealerweise sollen Fallbeispiele zusammengetragen werden, um Best-Case- und Worst-Case-Szenarien aufzuzeigen. Anhand dieser Sammlung könne (internationaler) Konsens gefunden werden, der PolitkerInnen europaweit bei der Umsetzung behilflich ist.

Science Policy Interface

Die Möglichkeiten für ForscherInnen, den politischen Entscheidungsfindungsprozess zu beeinflussen, seien rar. Unterschiedliche Schwerpunkte bei Forschung und Entscheidungs-trägerInnen erschweren zudem den Wissenstransfer. Wissenschaftlerinnen seien meist auf analytische und methodische Aspekte ausgerichtet, während EntscheidungsträgerInnen auf die Umsetzung der wissenschaftlichen Erkenntnisse fokussiert wären.

Im österreichischen Workshop hat sich herausgestellt, dass Lösungsansätze für eine Verringerung der Diskrepanz von Wissenschaft und politischen EntscheidungsträgerInnen vor allem auf einer Annäherung der Wissenschaft an die Bedürfnisse der BürgerInnen beruhen würden. Eine anwendungsnahe Forschung stelle sicher, dass die Ergebnisse direkt umgesetzt werden können. Eine Netzwerkbildung zur Stärkung des Wissenstransfers sei dabei essentiell. Noch besser wäre eine konkrete Zusammenarbeit, um die Forschung näher an die Gemeinden zu bringen. Angewandte Forschung könnte ein Input für Gemeindevorschriften und nachhaltige Gemeindeentwicklung sein.

Eine rein auf Umsetzung ausgerichtete Forschung ist jedoch nicht realistisch. ForscherInnen sollen auf Grund ihrer Expertise auch Fragen untersuchen können, die nicht im direkten Zusammenhang mit dem öffentlichen Gemeinwohl stehen. Die Bündelung der Forschungsressourcen solle ermöglichen, dass Zukunftsfragen ohne Umsetzungsdruck erforscht werden können.

Funding

Die Workshop-TeilnehmerInnen schlugen vor, gemeinsame Finanzierungsprogramme für die Inhalte Boden(funktionen), Raumplanung sowie Politik und Gesellschaft zu schaffen. Die Finanzierung solle Co-Funds (national/international), Privatwirtschaft und Initiativen integrieren. Eine Orientierung am ERA-Modell (European Research Area) für Innovation und Umsetzung könnte für Österreich geschaffen werden. Strukturfonds (z.B. Regionalförderung und ländliche Entwicklung) sollen in nationale Modelle eingebunden werden. In Österreich kann ein Zusammenschluss von regionalen Verwaltungen zur Problemlösung beitragen. Der politische Widerstand darf in dieser Hinsicht allerdings nicht unterschätzt werden.

Im Hinblick auf die Ausrichtung zukünftiger Förderprogramme bzw. Förderschienen müssen die MarktteilnehmerInnen genau definiert werden. Durch die Zielgruppenorientierung sollen die relevanten Akteure/Akteurinnen in ihrer gesellschaftlichen Rolle in einem angemessenen Zeithorizont definiert werden. Programme sollen Grundlagenforschung, angewandte Forschung, Umsetzung, Lehre und Bildung gleichwertig adressieren. Die Mehrwertdebatte im Forschungsbereich sei differenziert zu betrachten und darf nicht abschließend angesehen werden. Der Mehrwert müsse sowohl projektbezogen wie auch programmbezogen beurteilt werden. Indikatoren für die Messung von Innovation und Kapitalisierung der Ergebnisse müssen definiert werden, um die Kosten messbar zu machen. Optionen mit klar strukturierten Kosten werden bei Entscheidungen vorgezogen (siehe: Ecosystem Services vs. Einkaufscenter). Es werden Mechanismen zur Förderung/Finanzierung guter, unberücksichtigter Projektanträge und klarere Kommunikation der Qualität des abgelehnten Projekts durch EvaluatorInnen/FördergeberInnen benötigt.

Die Workshop-TeilnehmerInnen forderten neue Strukturen für den Ausschreibungsprozess und die Implementierung von Forschungsprojekten- und programmen, um nachhaltige Erfolge zu erzielen, Parallelforschung zu vermeiden und Umsetzungsdefizite zu verringern. Stakeholder auf politischer und Verwaltungsebene müssen vor der Ausschreibung oder Projekteinreichphase in die Problemdefinition involviert und in Hinblick auf die Abstimmung von Förderprogrammen möglichst früh miteinbezogen werden. Dies könne gegen Sektorpolitiken wirken, durch die Geld in Regionen investiert wird, wo niemand lebt, der es verwenden kann.

Ausschreibungen sollen Zielorientierung, Bewusstseinsbildung und Praktikabilität adressieren. Eine Vernetzung der Förderschienen sowie der Forschung mit Lehre und Praxis müsse stattfinden, damit Parallelitäten vermieden werden. Forschungsinhalte sind einem Prozess gleichzusetzen. Es soll von Grundlagen- in Richtung Anwendungs¬orientierung gehen und Rückkoppelungen zugelassen werden. Forschung und Anwendung seien ganzheitlich auszurichten. Neben einer horizontalen inter- und transdisziplinären Ausrichtung auf allen Ebenen, soll auch eine vertikale Ausrichtung (Einbindung aller Akteursebenen) integraler Bestandteil von Forschungsprojekten werden. Politische EntscheidungsträgerInnen (auch Gemeinden) und Stakeholder sind als gleichwertige PartnerInnen mit entsprechenden Verpflichtungen einzubinden. Ebenso muss die Gesellschaft die Möglichkeit erhalten, ihre Bedürfnisse darzulegen und eine verstärkte Mitwirkungsmöglichkeit wahrnehmen zu können. Reine Entscheidungsplattformen sind zu unverbindlich.

2.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for Austria. The information was collated in accordance with INSPIRATION D2.4. In Austria, 11 NKS were interviewed. Details on these NKS are provided in Annex I. The desk study was based on documents as suggested by NKS. These are listed in Annex II.

The Austrian workshop lasted for two days (detailed agenda Annex III). At Day 1, over a hundred participants addressed the most pressing societal challenges identified in the conducted interviews. Each participant had the possibility to add valuable insights at two different World Café tables. At the end of the day, the table hosts presented the results in the auditorium. The key points of these workshop sessions were included in the D2.5. At Day 2, selected NKS synthesized the results of Day 1 further. The focus of the second day was to agree on the main messages of the three key areas Research and Innovation Needs, SPI and Funding Options.

A draft version of D2.5 was sent out to the NKS. Two NKS replied and offered further improvements on the specific research questions. The low responds rate was probably due to the fact, that the NKS had the possibility to add remarks throughout the working period and provided further information before the draft version was sent out.

2.3 Research and Innovation (R&I) needs

2.3.1 Societal challenges and needs

In general, the interviews revealed that the EU societal challenges should not be seen as competing, but partly complementary and equally important. Tackling these systematic problems and challenges is necessary to secure life quality and long-term economic development.

According to the NKS, climate change should be regarded differently than the other societal challenges. The main focus should be on the protection of environment and the support of sustainability within the changing conditions and not climate change per se. Nevertheless, climate change is seen to be the number one threat as it is a very complex problem with a fast cascade effect, therefore needing fast solutions. The compartments air, water and soil should be “at grip”, and then research questions concerning climate change could be addressed.

Land consumption, land use and land availability are the most important topics. Food security will become more and more important due to increasing world population and increasing prosperity in newly industrializing and development countries, coupled with the associated changes in consumer habits and progressing climate change. Food security should be regarded from an international viewpoint to secure a responsible exchange and compensation of raw material and products between all states. Food autarky is not an explicit topic!

According to the interviewed NKS, the most important societal challenges are

1. Contribution to food security and food safety
2. Contribution to climate change mitigation and societal adaptation
3. Reduction of raw material and resource consumption; Ensuring efficient use of natural resources

Additionally, the interviewed NKS insisted on *(8) Protection of biodiversity* as one of the most important societal challenges.

The participants of the Austrian workshop concluded that there is a significant discrepancy between basic and applied research, which leads to a gap between science and civil society. However, the science’s sustainability is based on the society’s involvement. Participation and integration of relevant stakeholders (e.g. politicians, society) would lead to long-term partnerships and implemented research results. Integrative and participative research allows for societal problems to be brought to scientists (e.g. BMWFW 2015a). Long-lasting results are only possible if societal needs are identified before existing knowledge is consolidated and specific research and innovation demands are defined. After a project ended, success and implementation have to be evaluated to assess the added value for society and environment. Therefore, appropriate indicators and regulations have to be developed or implemented.

Politicians need valid knowledge to reduce the societal pressure on certain types of land use. It is necessary to consolidate existing knowledge, methods and concepts before new research is conducted. It should be the duty of researchers to deliver scientific results to

show how the framework conditions can be changed to support sustainable land use and manage land use conflicts. However, research should not only focus on applicability, but also on innovative questions of bottom-up research that could help our societies in the future.

Implementation research alone will neither be sufficient nor realistic. Researchers have to be able to explore research questions on the basis of their expertise without the pressure of implementation and societal benefit. Science continues to have a consulting role in terms of fundamental research. Many scientific topics are still prospective topics in practice. There is not only an obligation to provide knowledge by the scientists, but also an obligation to claim it by the politicians and policy makers.

2.3.2 Topics / research needs to include in the SRA

AT-1: Soil and land management contribution to food security

In light of climate change and adaptation to new climatic conditions, land consumption is an urgent topic as it directly impacts food production. Soil and production conditions have to be considered, when area is assigned to different purposes. Land for food production has to compete with a whole range of other uses such as fodder production, raw material production, energy production, mobility and transport. Although the workshop participants urge to give food production the priority, the reality depicts a different picture.

Demand

- Does food security have to have the priority over other land use options?
- How much agricultural area is “lost” to reforestation?

Net impacts

- What are effective incentives to avoid building on prime agricultural land?
- How can the many part-time farmers in Austria be supported to maintain their small scale farms?

AT-2: Improvement of management measures for the cultivation of agricultural land

This is a very urgent topic because it addresses people worldwide. Possible indirect impacts of land cultivation should be taken into account (e.g. Sahel zone: interconnection husbandry and erosion). Implementable solutions with regard to regional adaptation are necessary. An international implementation of improved management measures will have a tremendous impact for small- and large-scale farmers. Funding could come from international organisations (e.g. FAO, UNO, OECD, IWF).

Land management

- How can the improvement of management measures be achieved with progressing digitalisation?
- How can phosphor recycling contribute to sustainable food production?
- How can sustainable intensification be managed and how can cultivation methods be improved to contribute to this goal?

Net impacts

- How does an optimal knowledge transfer look like? An essential key to improve the situation is a consequent education of land users. Here, adequate models should be developed and implemented. A combination of theory and practice is necessary!
- What are the effects of climate change on agricultural greenhouse gas emissions?

AT-3: Digitalisation and usage of existing/new technology

Pressure on costs and time exists. Manpower becomes less and less important on agricultural farms. Farmers have to react to the changed and changing climatic conditions. Agricultural engineering has many developments, which should be considered.

Funding could come from the funding ministerial department of BMVIT.

Land management

- How can new technologies and advanced digitalisation help farmers to adapt to climate change?
- What practicable, digitalised solutions could help the remaining farmers?
- How can co-operation offer and secure technical pre-conditions (e.g. Maschinenring or similar structures, purchase of special machinery)?
- Research in precision agriculture (under consideration of spatial and temporal restrictions)

Net impacts

- How can smart grids (electricity, water use, communication with end-user, ...) contribute to sustainable land management?

AT-4: Dealing with natural hazards

Various natural hazards affect the Austrian counties differently. Nuanced approaches are necessary for legal guidelines, but are often difficult to reach because of the assessment of the remaining risk. Centralised strategic planning is not the solution. However, all counties will need more precaution for extreme weather events. The West will need further flood protection and the East a more pronounced water saving cultivation to combat droughts. The priority should be knowledge gathering and access to information for all involved levels (from home-builders to mayors).

Demand

- What is the area demand for flood protection areas, levees, residential areas, (water) transportation ways, retention areas, nature conservation areas and danger zones?

Land management

- What is the contribution of soil to water retention?
- How can open space be useful as a barrier and for higher resilience in context of climate change (e.g. alignment of spatial structures, keep infrastructure embankments clear in the alpine regions?)
- How can open space be used to tackle potential conflict of interests for nature conservation, silviculture and areas for hazard prevention?
- How can flood protection areas be used in times of no floods? (yield, contaminants, functions, soil structure, leakage capability, ...)

Net impacts

- How can information and access to information for all involved levels (from home-builders to mayors) be improved?

AT-5: Monitoring and evaluating land and soil use for settlements and infrastructure

In Austria, an adequate tool for the assessment of land and soil use is not yet implemented. The development of an objective assessment and registration tool would be sensible. This could be the foundation for a comparable survey of the data basis. The assessment is the prerequisite for the development and establishment of indicators, which would make political goals reasonable. The use of indicators for the evaluation of measurements would also increase the public awareness. Furthermore, a uniform approach for the assessment of land use and soil loss (especially for land use other than agriculture and silviculture) would simplify the comparison nationwide.

Demand

- How much land is actually “consumed”? How are re-cultivated areas accounted for?

Natural Capital

- How much of the sealed area does not fulfil any soil function anymore?

Land management

- Which regional indicators and target values (e.g. sealing, flood protection, building density, type of agricultural cultivation) could support sustainable land use? How can they be implemented?
- Development of adequate classification with evaluation of lost soil functions (can be combined with GIS illustrations).
- Monitor, measure and evaluate sustainable land management techniques.

Net impacts

- Develop an implementable set of indicators to monitor and evaluate the impact of e.g. annual maximum land consumption, climate change effects or sustainable land use.

AT-6: Land use for infrastructure

Infrastructure decisions are often not reversible (e.g. power plants, urban sprawl) and not easy to handle. In Austria, the quality of soil is not a deciding factor in spatial planning (Zech, Blanda and Klingler 2010). A distinct gap exists between the assessment of soil in spatial planning and in soil sciences (Environment Agency Austria 2013a). Adequate tools for the assessment of land and soil use have not been implemented yet.

Natural Capital

- How should an adequate tool for the assessment of soil quality look like for soil sciences and spatial planning?

Land management

- How can vacated traffic infrastructure be assessed?
- What kind of indicators will help to secure bare land sustainably?

Net impacts

- How can the consideration of soil quality for infrastructure projects be improved?
- Are inter-municipality financial compensation or compensation funds for waiver of re-zoning to building zones a promising incentive to save green space?

AT-7: Restoration and re-cultivation of land

As soil and land are finite resources, the restoration or re-cultivation of unused or polluted areas is essential. Open questions regard benefits of re-cultivation, soil quality, liability of pollution and assessment of the pollution source and extent. Abandoned land should be re-purposed to be able to fulfil other necessary functions.

Demand

- How can sealed areas be re-cultivated to fulfil soil functions and improve land sparing elsewhere?

Natural Capital

- How can re-cultivation of soil be achieved in a way to save the most resources? (challenge: to achieve this for large construction sites as well as for small gardens; assess the added value for spatial planning)
- Develop a guideline to assess the soil quality on large construction sites in view of resilience.
- Assessment of pollutants (e.g. long-term impact of heavy metals or pesticides in soil; pollution load of high current masts, wood impregnation)

Land management

- What are the possibilities for re-cultivation of abandoned land and what are the benefits for sustainable land management?

Net impacts

- How can funds or incentives for re-cultivation support sustainable land use?
- Is it beneficial and implementable to let revitalisation costs be paid by the polluter or the user?

AT-8: Soil and landscape diversity

Austria's very diverse landscapes are due to various climate zones and morphologies. The protection of this diversity is essential for Austria's ecosystems, biodiversity and tourism. This heterogeneity should be secured and also assessed how it can be used sustainably. Research programs should consider the diversity of soils and landscapes (e.g. Alpine regions). Values such as aesthetics cannot be monetised easily. Additionally, the assessment is difficult because biodiversity can be identified on different scales (molecular, type,...). Furthermore, soil encloses a high and unexplored gene pool. The soil microorganisms have a high potential to be used in human medicine or as pest control against soil pathogens. Assessment of consequences of loss of soil species should be attempted.

Natural Capital

- How can the very diverse and small structured landscape be kept and cultivated to secure biodiversity of the landscape and the soils in Austria?
- Define a clear structured set of indicators and scales to unify the assessment of biodiversity.
- What kind of soil organisms can help human medicine?

Land management

- Are innovative forms of cultivation (e.g. minimal soil treatment, new crops, crop rotations, slurry management) appropriate for different types of soils?

Net impacts

- How can various funding and protection systems be used efficiently to save biodiversity?

AT-9: Decoupling of the economic impact

The topic of "natural capital" should be addressed more critically. The protection of close-to-nature areas is mostly not a pressing issue, although there is no restoration after loss. Loss of biodiversity means a transgression of the planetary boundaries. The spatial dimensions of societal actions should be considered. A depiction and consideration of the whole complexity of a society can avoid (collateral) damages (e.g. resource wasting life style).

Natural Capital

- Is a monetisation of ecosystem services necessary to achieve cost transparency and global equality?

Net impacts

- How can the value of ecosystem services be assessed? (not only monetary; consider access to agricultural land, soil as a legally protected good)
- How can bio-economy be implemented in Austria (e.g. decentralised units for Austria? preserve regional variety!)?
- How can sustainable soil use be monetised?
- Is the decoupling of economy and environmental effects a sustainable solution for the value assessment of soil?

AT-10: Demographic changes and urban land use

Urbanization and migration are evidently pressing societal challenges worldwide. Land consumption is an urgent topic (Environment Agency Austria 2013b). More attention for soil and land use is necessary due to competition in the usage. Adapted settlement structures for different age classes and generations with short walkable ways are social places that will sustain longer. The problematic nature of land use is that ideally more than one type of use is possible for the same area of land. The aim is to support different types of usage beside each other (living, working, agriculture, transport, energy generation, flood protection,...) (Stöglehner et al. 2011).

Demand

- How will climate change impact densely settled area and good quality soil with extreme rain events and erosion?

Land management

- What are (financial) incentives for the re-purpose of urban land?
- How can the problem for secondary residences be solved sustainably?
- Does Austria have potential to save or produce more energy on the given land?
- What should be the coefficient between green area and population density? How much park area is necessary to regenerate clean air for the city's population?

Net impacts

- How can spatial planning tools be used to support inner development, mix of different uses and to avoid decentralised concentrations?
- Investigate socio economic drivers for re-zoning.
- What is the motivation for land use change?
- How can re-zoning be made less profitable and attractive?

AT-11: Participative research and communication

Austrian citizens are not informed sufficiently on topics concerning soil and land management. Appropriate (public) awareness would help to bring the topic further along on the political agenda. Scientific research should be more accessible to the public (i.e. communicated understandably). The workshop participants urge for a committed budget for communication and awareness raising in research programs and projects, public participation and measures oriented to implement strategies. Awareness raising and demonstration of consequential costs of land use changes have to be one of the main outcomes of research projects.

Net impacts

- If no funding can be found to implement research projects where needed, is crowd funding a sustainable option?
- What requirements are necessary to increase participation on all levels within research projects?
- How can the impact of research projects be assessed regarding the improvement of public awareness?
- How can participation and communication improve the overuse of allocation of building land?
- Develop and implement easy and accessible communication tools for the public to raise their concerns and problems (e.g. interactive panels to connect scientists and people interested in science).
- Create soil function maps to show ideal and actual usages of areas.
- Create better information, data and imagery for the media to support alternative lifestyles beside the one-family homes.

AT-12: Impact of research projects

The societal impact of scientific research is not currently evaluated in Austria. The tools and indicators are missing (e.g. for applied research the number of patents can be used as indicator).

Net impacts

- Development of tools for the evaluation of the impact of research projects.
- How should multidimensional (sustainable) impact assessments and reviews of consequences be conducted?
- How can public reactions to science projects and their implementation be assessed?
- Create better ways to show impacts: holistic models and communication tools
- Combine best- practice examples to support political decision making.

AT-13: Political regulations and involvement

In Austria, the legal regulations for soil and land use are very fragmented. The land agenda is in the hands of municipal, regional and state governments for different topics. The topic of land use is spread across various regulations such as water or waste management laws. The responsibilities of zoning and spatial planning are not the same as for soil management. The mayors are key players, but the community is often an insurmountable barrier (prejudices, e.g. no multi-storied houses in rural areas). It would be essential to develop a "communication package" for regulatory departments to increase the awareness for citizens and mayors.

Demand

- How can uniform laws and regulations for soil management and spatial planning be achieved in Austria? What pre-requisites are necessary?

Land management

- How can politics support demolition, restoration and sustainable zoning?
- How can the fractured responsibilities of the state, the counties and the municipalities be coordinated or unified to improve sustainable land management?

Net impacts

- How can feedback loops support the communication between departments and governments? What communication tools can be implemented?
- What political incentives and sanctions could drive sustainable land use?
- How can a political impact factor for scientific research look like?
- How can the municipal level be better included to connect regional politics and civic society? (e.g. inter-municipality networks and co-operations)

AT-14: Is the ideal spatial utilisation possible?

The central question is a solution for conflicts of interest - which solutions are prioritised, which are put on hold? Decisions sometimes are not reversible (e.g. power plants, urban sprawl) and not easy to handle. A major concern is the deciding factor. Most often there are overlaps in usage (e.g. dense settlements following well connected traffic routes with a certain noise problem vs. wide urban sprawl along the city boarder/ exurbs). The legal aspects have to be re-defined (who is responsible: state/county/municipalities, EU, tourism/nature conservation, law makers, land owners, also scientists, ...). In this context the question of “soil as property” has to be answered. Is soil public property? Furthermore, questions concerning the societal impact on soil should be scientifically researched.

Demand

- How can we resolve conflicts of interest around soil as private property with public value?How do we handle land use rights and public interest legally?

Land management

- What is an ideal way of spatial planning for different regions?

Net impacts

- How should spatial utilisation look like ideally in the future? E.g. is a mobility-protecting development also area and soil sparing? Can different goals be fulfilled at the same time?
- What changes in framework conditions are to be expected?
- How do processes and instruments look like? What are possible deficits?
- What is the societal impact on soil?

2.4 Experiences regarding connecting science to policy/practice

2.4.1 Use of knowledge

Scientific knowledge is understood as secure knowledge established on the basis of theories and complementary methods, which are comprehensible and can withstand a certain methodology and verification (verifiable - comprehensible - methodological - new). Quality assurance and scientific consent is given in terms of peer reviews and discourse.

Scientific knowledge is used (1) for teaching and informing co-workers, (2) for producing scientific knowledge as an informative basis, (3) for (environmental impact) assessments and evaluations, (4) in context of consulting or submissions and (5) for publications. The sources of scientific knowledge are various: scientific sections in daily or weekly newspapers and journals, reports, scientific papers, websites (such as MOOCs), open access, proposals, conferences, consultants and through co-operations with universities. In some cases, the interviewees use more grey literature than published documents because it contains more relevant information.

2.4.2 Possibilities to set the agenda

Currently, a distinct gap between politics and science is perceived by the workshop participants and the interviewees. They recommend developing instruments and communication strategies to decrease this gap. Scientific research policies/agendas cannot be influenced easily without political support. The necessary political support could be secured by raising public awareness and therefore political pressure. Especially in the area of environment, it is important for researchers to communicate scientific findings in an appropriate and accessible way to policy-makers. The findings serve as fundamental basis for decision making towards environmental problems and sustainable solutions. The dialogue between the scientific and policy-making communities needs to be strengthened to improve linkages between policy needs and research programmes as well as to enhance the accessibility of scientific knowledge to policy makers. Political support is especially necessary for stakeholder processes, consultations of research policy (e.g. investments, prioritisation, and instruments) and state-county- co-operations. It would be essential to develop a “communication package” for regulatory departments to increase the awareness for citizens and mayors. Already existing knowledge needs to be better transferred to the communities (e.g. energy pass for settlements, NIKK NÖ InfrastrukturKostenKalkulator) (Stöglehner et al. 2014).

The opportunities for researchers to influence political decision-making are rather scarce. Decision-makers are focussed on the implementation of scientific findings, whereas research experts are mostly oriented on analytical and methodological aspects. Research studies are mostly written for scientific communities and are consequently not easily comprehensible for decision makers. It is important to translate the scientific knowledge in “common” language to enhance public understanding. The knowledge transfer is additionally aggravated by the different emphasis of science and political stakeholders. Network building to enhance the knowledge transfer would be essential. Specific co-operation to bring research closer to the municipalities would be even better. Regional management agencies could function as bridging institutions to suffice both local/regional needs and research results.

The setting of scientific research policies/agendas can only be influenced to a very small extent. This is possible e.g. with the allocation of budget for certain research projects, in raising questions to the administration, within and via expert committees, and through co-operation with research institutions.

The state-of-the art in scientific research indirectly influences the existing policies. Comprehensive soil topics are rare. Research studies are manifold, but the access to results is restricted, as is a good overview. A coherent research portal is missing and a high potential for the alignment of existing knowledge is apparent. Consolidation of knowledge is essential, but should happen in light of cultural differences. To improve business opportunities, gathered knowledge should be immediately used, as information is in most cases available. An essential criterion for the exploitation of scientific knowledge is the possibility for implementation. Research results could be a viable input for municipality regulations and sustainable municipality development. A summary of best practice examples could show successful research implementations to the public. This guide supports politicians to achieve consensus and implementation in their scope.

A national agenda specific to the scope of INSPIRATION is not known for Austria. Awareness of soil protection and sustainable spatial planning is not achieved on a satisfying level neither in politics, nor in the general public and society. The topics soil and land use do not have any financial support or lobby. The national policies/agendas do not reflect general needs, but specific ones. Many long-term projects were abandoned or have reduced financial support, which is seen by many scientists as the wrong decision. Societal challenges are only tackled short term, whereas they should be considered for the long term. The current financing and funding systems and the response to policy needs are adverse to innovation. It is necessary to put the focus on application-oriented research to secure implementation. Currently, research agendas are mostly disciplinary and not inter- or trans-disciplinary. However, a broad application of applied and inter-/trans-disciplinary research increases the potential for societal added-value.

2.4.3 Science – policy – practice

Most of the interviewed NKS were involved in the formulation of scientific research questions. NKS formulate their own research questions for project proposals, university theses, workshops on research programs and event series. If they were not involved in the formulation of research questions, the thematic programs of their institutions more often focused on the implementation or consultation and less on the development of projects.

Austrians traditional allocation of competences in land use agendas is a significant problem for policies. Land agendas are in the responsibility of the county, which inhibits the possibility to regulate access rights by state law (Environment Agency Austria 2015). It is very difficult to protect soil and land nationwide with the current jurisdiction. This allocation of responsibilities hinders nationwide regulations. Regulations concerning re-cultivation or soil quality exist, but are voluntary (Fachbeirat für Bodenfruchtbarkeit und Bodenschutz 2012, Zech, Blanda and Klinler 2010). No overarching laws or directives exist for fostering nationwide research in the field of soil and spatial planning. As an example, the state does not allocate research (funding) to spatial planning because it is in the responsibility of the county. The principle of the separation of competences is very difficult to apply in practice, as co-operation is necessary over all levels. A further difficulty is that the factual competence of spatial planning lies with the municipalities (ÖREK 2015). Financial support relies on registered residents of the municipality. Therefore, municipalities are interested to change the zoning to increase the immigration and availability of jobs. The goal to save resources is than less important and not a priority (ÖROK 2011).

In Austria, the Austrian Conference of Spatial Planning is organising the agendas of spatial planning (ÖROK 2016). ÖROK addresses recommendations and agendas for spatial planning on national level, which means agendas are often consent-oriented and not firm enough. An improvement in Austria can be achieved with two different approaches; 1) financial benefits for resource-saving measures or 2) restriction of intervention possibilities for municipalities, e.g. the spatial planning laws of the counties. An example for good-practice is the county Salzburg, where future zoning for building land is connected to the availability of public transport (Land Salzburg 2009). The opposition in the municipalities, which resulted from these laws, shows the difficulty for implementation. European countries with centralised intervention possibilities have an advantage.

Applied research should be an obligatory input for municipality regulations. As an example, Agenda 21 projects support the EU Strategic Environmental Assessment as a core project leader. The implementation of scientific research is very diverse and depends on the individual interest and problems of the various municipalities (and even on the specific mayor). Therefore, also the solutions have to be very individual. Scientific research programs should have a stronger implementation focus to be politically viable. A secured sequence of projects for a certain topic could allow for a long-term implementation of the project results.

A key component to solve the discrepancy between science and politics is for the scientific community to approach the public and take into account their problems and needs. This would start by the research questions, which should be provided partly by the stakeholders, and continue throughout the whole process of a research project.

Science-Policy-Interface documents

Surprisingly, a higher number of SPI documents were found for sustainable soil and land use management than assumed after the interviews (e.g. BMLFUW 2011). This clearly contradicts the statements of the interviewed NKS and the workshop participants who said that not a lot of information is available for the public.

The following SPI documents were identified to contain essential information for soil management and land use and are available publicly:

BMLFUW. (2011). Grund genug? Flächenmanagement in Österreich - Fortschritte und Perspektiven. Wien.

BMLFUW. (2015). Reduzierung des Verbrauchs landwirtschaftlicher Böden - Maßnahmenvorschläge. Wien.

BMLFUW. (2008). (Bau)Land in Sicht - Leitfaden zur Wiederverwertung von industriellen Brachflächen. Wien. Available from: https://www.bmlfuw.gv.at/service/publikationen.html [2016-01-28]

BMWFJ and BMLFUW (2010): Eckpunkte der Energiestrategie Österreich. Available from: http://cdn1.vol.at/2010/03/Energiestrategie1.pdf [2015-12-13]

BMWFW. (2015a). Wissenschaft und Gesellschaft im Dialog - Responsible Science. Wien.

BMWFW. (2015b). Action plan for a competitive research area. Wien.

Bundeskanzleramt, Bundesministerium für Finanzen, Bundesministerium für Unterricht, Kunst und Kultur, Bundesministerium für Verkehr, Innovation und Technologie Bundesministerium für Wirtschaft, Familie und Jugend Bundesministerium für Wissenschaft und Forschung (2011). Strategie der Bundesregierung für Forschung, Technologie und Innovation. Wien.

Bundesregierung (2015). Österreichischer Forschungs- und Technologiebericht 2015. Wien

Chemnitz, C. and Weigelt, J. (2015). Bodenatlas. Available from: www.boell.de/bodenatlas [2016-01-28]

Fachbeirat für Bodenfruchtbarkeit und Bodenschutz - Arbeitsgruppe Bodenrekultivierung (2012). Richtlinien für die sachgerechte Bodenrekultivierung land- und forstwirtschaftlicher genutzter Flächen. 2. Auflage. Wien.

Fachbeirat für Bodenfruchtbarkeit und Bodenschutz. (2013). Bodenfunktionsbewertung - Methodische Umsetzung der ÖNORM L1076. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, Wien.

Institut für Raumplanung und Ländliche Neuordnung, Institut für Prozess- und Partikeltechnik, Studio Schlierbach. (2011). Energetische Langzeitanalysen für Siedlungsstrukturen - Factsheet für Private AnwenderInnen. Available from: http://www.elas-calculator.eu/res/de/ELAS_Infopaket.pdf [2016-01-28]

Land Salzburg. (2012). Bodenschutzbericht 2001-2011. Available from: http://www.salzburg.gv.at/themen/lf/landwirtschaft-2/bodenschutz-themenunterseite.htm

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2.5 National and transnational funding schemes

2.5.1 Funding schemes and possibilities for research funding

Funding options are best set up and funders will experience that their invested national Euros are indeed multiplied, when (1) inter-/trans-disciplinary approaches, (2) action/applied research as well as (3) local issues (e.g. local implementation AND answering local questions) are considered.

To approach wide acceptance and secure best multiplication, it is critical to involve the civil society and all stakeholders (e.g. land owners, spatial planners, soil scientists, politicians) in funded projects. According to frequent experiences political decision makers should be consulted as early as possible and kept in the project throughout the project period. They can verify the feasibility of the project. Network building and the elimination of fragmentation increase the added value of financial resources.

It is of key importance to formulate socio-political issues in a more understandable way, and to translate them into a user-friendly language. Summaries for the non-science community should be provided in an understandable language. The communication of open questions should address politics, society, land users and land owners. It seems to be necessary to raise awareness of decision makers towards research programmes and connected goals.

The establishment of national platforms additionally to the existing research institutions would be helpful for the coordination of such topics. More generally, there is the problem that projects, which are not put into practice, are not economically assessed.

The focus should not only be put on the realisation of profit but rather on raising of public awareness and the practice-orientation. Program leaders should be sensitised for integrated topics, as the relevance for politics increases with the integration of the programmes. In order to reinforce the added value of different financial resources (for EU and national demands), researchers, funders and questioners should establish a clear structured research platform for a wide range of different articles and reports about the topics soil and spatial planning.

R&I funding options collated for country:			AUSTRIA	
	Name	**Research and Innovation funder**	**What and/or whom do they fund?**	**More info**
Regional				
1	direct funding and commission	Counties and Municipalities		
2	ÖPUL	Federal Ministry of Agriculture, Forestry, Environment and Water Management	Austrian Program to fund agriculture that protects an environmental friendly, extensive and natural living space	https://www.bmlfuw.gv.at/land/laendl_entwicklung/oepul/bodenschutz-und-agrarumweltprogramm.html ; https://www.ama.at/getattachment/9156f06a-7896-44e8-94ca-35e4fda7b158/Merkblatt_OPUL-2015_Internet_25-03-2015.pdf
National				
1	PFEIL 15 | PFEIL 20	Federal Ministry of Agriculture, Forestry, Environment and Water Management	basic structure for national focus in commissioned applied agricultural and environmental research and intra-ressort research;	hhtps://www.bmlfuw.gv.at/forst/forst-bbf/Forschung/pfeil15.html
2	LE14-20	Federal Ministry of Agriculture, Forestry, Environment and Water Management	sustainable agriculture	https://www.bmlfuw.gv.at/land/laendl_entwicklung/erstellung_programm_le1420/LE2020.html ; https://www.bmlfuw.gv.at/land/laendl_entwicklung/foerderinfo/veroeffentlichung_stichtag_aufrufe1/veroeffentl_andere.html
3	ACRP 9	KLIEN Klima- and Energiefonds	basic research on climate change	www.klimafonds.gv.at

4	State-County-Cooperation	Federal Ministry of Agriculture, Forestry, Environment and Water Management	energy and environment research; joint research projects of BMLFUW with other federal agencies or counties	
5	Special Specific Research Programmes	Wissenschaftsfond FWF Austrian Science Fund	scients who work in Austrian universities or non-university research establishments; Building up of extremely productive, tightly interconnected research establishments for long-term and interdisciplinary work on complex research topics	http://www.fwf.ac.at/en/research-funding/fwf-programmes/special-research-programmes-sfb/
6	Stand-alone projects	Wissenschaftsfond FWF Austrian Science Fund	individual research in the area of non-profit research; for scientists who work in Austria	http://www.fwf.ac.at/en/research-funding/fwf-programmes/stand-alone-projects/
7	StartClim	StartClim	impulse catalyst for climate change adaptation	http://www.startclim.at/ueber-startclim/
8	BRIDGE	FFG Austrian Research Promotion Agency	research and science transfer; joint projects basic and applied research	https://www.ffg.at/Bridge%20Wissenschaftstransfer
9	COIN Cooperation & Innvoation	Federal Ministry of Science, Research and Economy	aims for an improved innovation performance in Austria with better and broader implementation of knowledge	https://www.ffg.at/coin-cooperation-innovation
10	COMET Competenc Centers for Excellent Technologies	Federal Ministry of Science, Research and Economy - Federal Ministry for transport, innovation and technology	set-up of competence centers	https://www.ffg.at/comet-competence-centers-excellent-technologies
11	Basic Program	FFG Austrian Research Promotion Agency	research, development and innovation projects for business; life sciences, mobility, environment, energy, …	https://www.ffg.at/basisprogramm
12	Wissenstransferzentren und IPR Verwertung	Federal Ministry of Science, Research and Economy - Federal Ministry for	national universities	http://www.bmwfw.gv.at/Innovation/Foerderungen/Seiten/WissenstransferzentrenundIPR-Verwertung.aspx

		transport, innovation and technology		
European				
1	LIFE 2014-2020			http://www.eu-foerderungen.at/foerderprogramme detail.php?id=373
2	Interreg Alpine Space Program	European Regional Development Fund	Innovative, CO2-reduced liveable Alpine Region; Transnational co-operation in competitiveness and attractiveness, accessibility and connectivity and environemnt and risk prevention	http://www.alpine-space.eu/ http://www.alpine-space.org/2007-2013/http://www.oerok.gv.at/eu-kooperationen/etz-transnational-netzwerke/alpine-space-2014-2020.html
3	Interreg Central Europe	European Union and European Regional Development Fund	Regional cooperating on low-carbon strategies, regional cooperating on natural and cultural resources for sustainable growth	http://www.interreg-central.eu/http://www.oerok.gv.at/eu-kooperationen/etz-transnational-netzwerke/central-europe-2014-2020.html
4	Interreg Europe	European Regional Development Fund	regional and local governements to develop and deliver better policy	http://www.interregeurope.eu/http://www.oerok.gv.at/eu-kooperationen/etz-transnational-netzwerke/interreg-europe-2014-2020.html
5	Interreg Danube Transnational	European Regional Development Fund (ERDF), Instrument for Pre-Accession Assistance II and European Neighbourhood Instrument	transnational co-operation promoting economic, social and territorial cohesion Good Governance development and practical implementation of piolicy frameworks, tools and services and concrete small-scale pilot investments	https://www.ffg.at/beyond-europe
6	Beyond Europe	Federal Ministry of Science, Research and Economy	supports Austrian companies, research and university institutes and other organisations in creating and extending collaborations	
7	Article 185	Federal Ministry of Science, Research and Economy	coordination of national F&E programs; EU member states	https://www.ffg.at/artikel-185

8	PPP Private-Public-Partnership	European Commission	industry and public sector	https://www.ffg.at/private-public-partnerships
9	JPI Joint Programming Initiatives	EU and member states	societal challenges: climate, change, energy and food security, healthy aging	https://www.ffg.at/joint-programming-initiativen
10	ERA-Net	Wissenschaftsfond FWF, European Commission	Coordinates national and regional research programs and supports bilateral research projects with closely integrated content; application deadlines vary from country to country	http://www.fwf.ac.at/en/research-funding/fwf-programmes/international-programmes/joint-projects/
International				
	none mentioned			

2.5.2 Gaps in financial resources for research

The Austrian workshop participants see a distinct need for new structures of the call process and the implementation of new research projects and programs. This would be necessary to secure sustainable successes, avoid parallel research and reduce implementation deficits.

According to the Austrian workshop participants, future funding programs and schemes should include:

- goal orientation and practicability
- inter- and trans-disciplinary on all horizontal and vertical levels
- awareness raising
- a clear definition of the market stakeholders in their socio-political role in the relevant time frame,
- interconnection of funding schemes
- clear added value of research and innovation investments,
- added value for the project and program, respectively, validated after the end of the project and after continuous implementation,
- fundamental research, applied research, implementation, teaching and education equal to facilitation of feedback between them,
- monetised indicators to assess innovation and capitalisation of the outcome
- budget for short-term topics that arise after the application period of projects (to secure funding for research without the pressure of implementation)

In particular with regard to soil topics and land management, long-term projects, monitoring programs and socio-political topics, there is a clear need for strengthened action and de-bureaucratisation. These topics should be made more publicly accessible and new funding schemes/infrastructures are necessary for:

- scientific communication
- involvement of the civil society and relevant political and scientific stakeholders from the problem definition of a project throughout to the validation at the end
- programs for an interdisciplinary approach and translators between disciplines
- a transparent research platform for soil and spatial planning (an externally coordinated platform, where all important stakeholders can come together)
- merging of responsible competencies on county level

It is still a fact that it is not easy to connect implementing and research institutions. Overarching funding schemes are generally missing (BMWFW 2015b). In Austria, merging the regional administrations could simplify outdated, complex structures, but the political resistance would be tremendous. The existing knowledge on regional and national level could be evaluated and connected, overall costs could be reduced and data could be used for other projects. This added value could generate even more data and knowledge if implemented and should be considered more so for the public good.

Political stakeholders on municipality or regional level should be involved before the actual submission period to contribute to the problem definition. This could avoid sector politics and money flow in regions where nobody needs it.

The EU cannot fund future research projects alone and is therefore dependent on national co-funding in form of e.g. public-private partnership or structural funds. For the workshop participants in Austria, a desired outcome would be a combined funding program for soil management, spatial planning, politics and society based on the ERA model. Co-funding, private sector companies and initiatives should be integrated.

Rejected, but good project proposals are perceived as damaging to the national economy. Mechanisms are missing to fund rejected projects, if the project is of high quality, but was proposed to the wrong funding institution. Therefore, evaluators and funders should have to communicate the quality of the rejected project proposals. Large projects should only be approved after hearings and multilevel procedures.

2.6 Other remarks made by interviewees

It was suggested that the European Soil Association could hold a communication role at the regional implementation level for topics on soil and land use (e.g. newsletter, workshops). It could connect to municipalities, regional institutions and university institutes.

2.7 Annexes

Annex Ia: NKS interviews in Austria

Date of interview	Organisation	Interview	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./research inst	SME /consultant	business &industry	NGO	network	other	soil	sedi-ment	water	land use-management
17-07-15	National Government of Lower Austria	Ilse Wollansky	1			1										1
20-07-15	FFG - Austrian Research Promotion Agency		1									1	1			1
12-08-15	Institute of Spatial Planning andRural Development, BOKU (personal opinion)	GernotStöglehner			1		1									1
20-08-15	Federal Ministry of Agriculture, Forestry, Environment and Water Mgmt.		1			1							1	1	1	1
28-07-15	Austrian Agricultural Chamber	Guenther Rohrer		1		1							1			1
24-08-15	European SoilAssociation				1						1		1			1
19-07-15	Federal Ministryof Traffic, Innovationand Technology		1			1										1
24-08-15	Government of Salzburg		1			1							1			

14-09-15	Federal Ministry of Science, Research and Economy		1			1							1	1	1	1
28-09-15	Technical University Vienna (personal opinion)	Arthur Kanonier			1		1									1
17-11-15	Former General Secretary of Int. Soil Science Society, Prof em.	Winfried E.H. Blum			1		1						1			

Annex Ib: NKS questionnaire template

See Chapter 1, Annex I

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

See Chapter 1, Annex II

Annex II: Documents used for the AUT desk study

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Annex IIIa: Workshop Agenda

Day 1: 10. November

Day 2: 11. November

		R & I needs	SPI	Funding
9:00 – 9:45	Workshop Round 1			
10:00 – 10:45	Workshop Round 2			
11:00 – 11:45	Workshop Round 2			
12:00 – 12:30	Summary			
Lunch				

Annex IIIb: Workshop Participants

Titel	Name	Vorname
Mag. Dr.	Ausserladscheiter	Johannes
Mag. Dr.	Bauer	Thomas
Dr.	Baumgarten	Andreas
Dr.	Begusch-Pfefferkorn	Karolina
	Bernhardt	Jürgen
	Berthold	Helene
	Biricz	Matthias
	Bonvissuto	Grazia
DI	Bruckman	Viktor
	Dellinger	Valentina
	Deltedesco	Evi
Ass.Prof. DI Dr.	Dillinger	Thomas
Dr. Mag.	Djukic	Ika
	Dober	Melanie
DI	Eder	Johann Otto
	Em	Doris
Dr.	Englisch	Michael
DI	Färber	Barbara
	Fehr	Franz
DI	Fessl	Jakob
	Foldal	Cecilie
	Forstner	Stefan
Dr.	Friesl-Hanl	Wolfgang
	Fuchs	Britta
	Galdberger	Josef Emmanuel
DI	Gärber	Erika
	Gertloff	Sebastian
Univ.-Prof. DI Dr.	Gerzabek	Martin
	Golestani-Fard	Alireza
Mag.	Gritsch	Christine
	Haller	Helmut
DI	Hanke	Roland
	Hanke	Tatyana
	Hertler	Carolin
Dr.	Hickersberger	Michaela
	Höfer	Christoph
Prof. Dr.	Holzer	Gottfried
DI	Hromatka	Angelika

DDI	Huber	Sigbert
Mag.	Jagschich	Stefan
Tzt. Mag. Mag. Dr.	Jakisch	Gerhard
	Jöchlinger	Lisa
MSc	Johannsen	Lisbeth
	Jurasszovich	Sandra
	Kasper	Martina
Dr.	Kienzl	Karl
HR DI Dr.	Kilian	Walter
	Kitzler	Barbara
Univ.-Doz. Mag. Dr.	Kralik	Martin
	Kraus	Sonja
	Kreiml	Christian
	Krobath	Peter
Dr.	Kuderna	Max
DI	Kührer	Matthias
	Kusche	Wolfgang
DI	Lachmann	Bernhard
DI	Lair	Georg
	Langer	Romana
	Legner	Maria
	Lehtinen	Taru
	Maier	Regine
Prof. Dr.	Makeschin	Franz
	Mayer	Renate
	Mayr	Laura
Dr. habil.	Michel	Kerstin
	Minixhofer	Pia
DI	Mitterböck	Nora
DI	Mollay	Ursula
DI	Murer	Erwin
	Nagl	Martina
HR DI	Nelhiebel	Peter
Univ.-Prof.i.R. DI Dr.	Nestroy	Othmar
	Nilsson	Nikola
DI	Nolz	Reinhard
Dr.	Otto	Kaurzim
Ing. Major	Pecina	Emmerich
DI	Peham	Thomas
HR DI	Pehamberger	Alfred

	Peschek	Philipp
BSc	Plank	Claudia
DI	Pock	Maximilian
DI	Rechberger	Maria
	Rechenmacher	Andreas
	Reifer	Johanna
	Riederer	Daniela
LAbg. Mag.	Riedl	Alfred
	Rinklin	Julius
DI	Rohrer	Guenther
DI	Rongitsch	Simone
Dr.	Sager	Manfred
DI	Schaufler	Judith
	Schiefer	Jasmin
Dr.	Schima	Johannes
DI	Schindelegger	Arthur
	Schlossnikel	Bettina
	Schmidt	Corinna
BSc	Schneider	Martin
	Schwab	David
DI Dr.	Schwarz	Sigrid
Ass.Prof. DI Dr.	Seher	Walter
Dr.	Seiß	Reinhard
PD Dr.	Soja	Gerhard
	Sonnleitner	Anna
DI	Spanischberger	Andrea
	Spann	Caroline
DI Dr.	Spiegel	Adelheid
	Stangl	Rosemarie
DI	Stich	Robert
Assoc. Prof. Dr.	Stöglehner	Gernot
DI Dr.	Strauss	Peter
Dr.	Szlezak	Erwin
Univ.-Prof. Dr.	Tappeiner	Ulrike
	Tramberend	Peter
	Weigl	Martin
	Weissenbruger	Viktoria
Bakk.Techn.	Welter	Sarah
Ao. Univ.-Prof. DI Dr.	Wenzel	Walter
	Woelkart	Birgit

	Wohlmuth	Marie-Luise
Dr.	Zechmeister-Boltenstern	Sophie
	Zeddel	Sebastian
Prof.	Zeyer	Josef
Dr.	Zimmermann	Michael

NKS Day 2

Désirée Ehlers	Bundesanstalt für Bergbauernfragen
Cecilie Foldal	BOKU, Institut für Bodenforschung
Stefan Forstner	BOKU, Institut für Bodenforschung
Wolfgang Friesl-Hanl	AIT, Health & Environment Department, Environmental Resources & Technologies
Franziska Hesse	Wood K plus
Gerhard Jakisch	EU Co-Fin Consult
Max Kuderna	wpa Beratende Ingenieure GmbH
Renate Mayer	HBLFA Raumberg-Gumpenstein, Forschung und Entwicklung
Guenther Rohrer	Landwirtschafts-kammer, Marktpolitik
Anton Schabl	Schabl Consulting
Gernot Stöglehner	BOKU, Institut für Raumplanung, ländliche Neuordnung
Andrea Sutterlüty	Marktanalyse & Innovationsforschung Wood K plus
Erwin Szlezak	Amt der NÖ Landesregierung, Abteilung Landentwicklung
MichalisTzatzanis	FFG
Klaus Wagner	Bundesanstalt für Agrarwirtschaft, Abt. Agrarpolitik, Regionalforschung, Landsoziologie
Ilse Wollansky	NÖ Landesregierung
Josef Zeyer	ETH Zürich, Mikrobiologie

3. Belgium

Report by Nele Bal, Bavo Peeters

3.1 Executive summary

3.1.1 English version

Building, implementing and funding a European research agenda on soil and land use in co-creation with National Key Stakeholders: summary INSPIRATION phase 1

Belgians, Luxembourgish, Danish, Europeans have **common future societal challenges**, like climate adaptation, ensuring food safety and security, safeguarding/creating a healthy environment, … . Soil and land use often play a crucial role in tackling these challenges. Changes in demography and the related economic pressure have a serious impact on the quality of soil and land. How can our society **safeguard the quality of soil and land** and at the same time **tackle the societal challenges in a sustainable way**? And which **supporting (new) knowledge** on soil and land use is needed to do this?

INSPIRATION, a 3 year research project joining 20 partners from 16 countries, aims to give an answer to these questions by building an end-user oriented strategic research agenda (SRA) on soil and land use. The agenda includes the **development, the implementation and the dissemination** of new knowledge. Another aim is to develop a network of public and private funding institutions willing to **commonly fund** the SRA.

During the first phase of the project, the National Focal Points (NFP) must collect the necessary national information to build the research agenda: they have to make an inventory of National Key Stakeholders (NKS), interview NKS, perform a desk study and organize workshops with different national stakeholders among which funders, end-users and researchers across the various soil and land management disciplines.

This report summarizes the **results of the first phase of INSPIRATION for Belgium, with input from Luxembourg and Denmark.** OVAM is the NFP for Belgium. Interviews took place during the summer of 2015; the workshop was held on the 29th and 30th of October 2015 in Brussels.

A primary conclusion is that a **fragmentation** of the research landscape and policy field exists in Belgium (especially for soil and land use related topics), related to the specific state structure (federal state, composed of 3 communities - with their own language - and 3 regions). Each institution or administration has its own expertise, domain or competence, and a global Belgian vision (on the research) on soil and land use is not available. In Luxembourg and Denmark, this fragmentation plays a minor role. The consulted NKS are however unanimous about the importance of soil and land use on tackling future challenges: this role is fundamental, and intertwines with important societal issues. A first recommendation is therefore to approach the research on soil and land use in a **more integrated and systemic focused way** and to bridge the boundaries of the own expertise or policy domain. Systems process related synergies and tradeoffs can be taken into account more easily in this way. Reliable knowledge about the distinct parts of the global system remains indispensable, being the building bricks of the whole.

Future research needs vary from very specific expertise (like risk evaluation for contaminated sites) to “more horizontal oriented” themes (like conflicts about land use). Given the intertwining of the themes, a “separated” thematic description of each theme is difficult, as they tend to overlap, mix and influence each other. The soil and land use topics and their related research questions should therefore always be considered within the bigger soil and land use system. An **integrated research approach** or **focusing on the more horizontal oriented themes** are stressed as a priority: this kind of research is currently not part of the research agendas and the necessary knowledge, and expertise is lacking.

Most of the research needs are common for Belgium (and its different regions), Luxembourg and Denmark, each country/region with his own accents. The relevant differences are described in the report.

A second recommendation concerns the need for **more intensive collaboration between stakeholders**: during the formulation of research questions and during the knowledge development, co-creation between stakeholders is the key to come to a well-balanced distribution of short term versus long term issues, of practical-applied versus fundamental-theoretical research, for the different scale levels (in time and space) and for the different sectors and policy domains. Co-creation (and co-funding) also **fosters the implementation and dissemination** of the developed knowledge. However, his approach takes more time.

Participants also stressed that beside the development of new knowledge, it is important to pay more attention to unlocking, connecting, translating, implementing and disseminating **existing knowledge**. **Knowledge brokers** can play a coordinating and facilitating role in this process, they can also be partners in stakeholder coaching. Stakeholders need a tailor-made translation and dissemination into **applicable knowledge**. **Interactive digital platforms** and **learning stakeholder networks** could also foster the exchange of data, knowledge and experience.

Concerning the research funding, NKS indicate that budgets are often **fragmented** because of the extreme portioning of expertise and competences between different disciplines and sub-disciplines and research agendas. **Putting funds together** is recommended to fund larger integrated long term research (e.g. under the form of spider web constructions). Research on soil and land use is not a popular topic with funders at the moment: it is important to **clearly show the added value** of this research to the decision makers, e.g. by **assessing** and taking into account the societal costs linked to unsustainable soil and land use or by **visualizing** inspiring win-win approaches (showing recognizable examples).

Mind shift and change in behavior are the engine and the catalyst for change. NKS make a plea for the **integration of social sciences** into soil and land use related research. These sciences feed the “why” and “how” of this awareness raising. Providing tailor-made knowledge and communication fosters the **awareness and “call to action”** of sustainable soil and land use at all levels in society. The support of “best practice **pioneers**” encourages a faster transition.

Finally participants stressed that set requirements should ensure and support the research agenda: a reliable **legal framework**, a stable **political climate** and a **regulation of the (economic) market.**

In the next phases of the project, the European strategic research agenda will be built based on the collected information from each country. The follow up will be reported on the website http://www.inspiration-h2020.eu/.

3.1.2 Dutch version

Samen een Europese onderzoeksagenda over bodem- en landgebruik opstellen, implementeren en financieren: samenvatting van INSPIRATION fase 1

Belgen, Luxemburgers, Denen, Europeanen hebben gemeenschappelijke uitdagingen voor de toekomst, denk maar aan klimaatadaptatie, het garanderen van voedselzekerheid- en veiligheid, een gezonde leefomgeving, … . Bodem- en landgebruik spelen vaak een cruciale rol bij het aangaan van de transitie naar een samenleving binnen de grenzen van de planeet. Door de wijzigingen in demografie en de daar bijhorende economische belasting staat de kwaliteit van bodem en land echter onder steeds grotere druk. Hoe zorgen we er als maatschappij voor dat de kwaliteit van bodem en land gevrijwaard blijft én dat maatschappelijke uitdagingen op een duurzame manier aangepakt worden? En welke (nieuwe) kennis op vlak van bodembeheer en landgebruik is hiervoor nodig?

Om een antwoord te bieden op deze vragen stelt INSPIRATION, een drie jaar durend onderzoeksproject met 20 partners uit 16 Europese landen, een strategische onderzoeksagenda voor bodem- en landgebruik op**,** die bottom-up up vertrekt vanuit de noden van kennisgebruikers en financiers. Zowel het verwerven van nieuwe kennis, als de verspreiding en de toepassing ervan komen aan bod. Een andere belangrijke doelstelling is een netwerk op te zetten voor samenwerking en financiering, zodat de onderzoeksagenda ook effectief uitgevoerd wordt.

In een eerste fase van het project verzamelen de Nationale Focus Punten (NFP) binnen hun eigen land de nodige informatie om deze onderzoeksagenda op te bouwen. Zij inventariseren de Nationale Key Stakeholders (NKS), interviewen een aantal van deze stakeholders over de state-of-the-art binnen het onderzoek over bodem- en landgebruik, voeren een literatuurstudie uit en toetsen de resultaten van interviews en literatuurstudie tijdens een workshop.

In dit rapport worden de resultaten van de eerste fase van INSPIRATION voor België, met eveneens input vanuit Luxemburg en Denemarken, weergegeven. OVAM treedt op als NFP voor België. De interviews werden uitgevoerd in de zomer van 2015; de workshop vond op 29 en 30 oktober 2015 plaats in Brussel.

Een eerste vaststelling is dat zowel het onderzoeks- als het beleidsveld in België door de specifieke bestuursvorm (een federale staat, samengesteld uit 3 gemeenschappen (met een eigen taal) en 3 gewesten) versnipperd is, zeker op het vlak van bodembeheer en landgebruik. Elke instelling of administratie heeft zijn eigen expertisedomein of bevoegdheid, en een globale Belgische visie over (onderzoek over) bodem- en landgebruik is er niet. In Luxemburg en Denemarken speelt deze versnippering minder. De bevraagde NKS zijn wel eensgezind over het belang van bodem- en landgebruik bij het behalen van toekomstige uitdagingen: deze rol is fundamenteel en is sterk verweven met de belangrijke maatschappelijke vraagstukken. Een eerste aanbeveling luidt bijgevolg om onderzoek naar bodem- en landgebruik meer geïntegreerd en systeemgerichter aan te pakken en daarbij de

grenzen van het eigen expertiseveld of beleidsdomein te overbruggen. Synergiën en tradeoffs tussen systeemprocessen kunnen zo gemakkelijker in kaart en in rekening gebracht worden. Betrouwbare kennis over de aparte onderdelen van het grotere geheel blijft uiteraard belangrijk als bouwsteen van het systeem.

De actuele of toekomstige onderzoeksnoden variëren van specifieke expertisedomeinen, zoals risico-evaluatie voor verontreinigde bodems, tot bredere thema's, bv. conflicten in landgebruik. Omdat thema's verweven zijn, treedt vaak overlap, vermenging en beïnvloeding tussen de topics op, wat een "aparte" inhoudelijke beschrijving soms bemoeilijkt. In feite moeten de thema's, met hun gekoppelde onderzoeksvragen, steeds binnen het grotere bodem- en landgebruikssysteem beschouwd worden. Onderzoek naar een geïntegreerde aanpak of naar meer horizontale, holistische thema's wordt als prioritair aangeduid, omdat deze nog niet (of beperkt) in de huidige onderzoeksagenda's zijn opgenomen en de nodige kennis en expertise hierover bijgevolg ontbreekt.

De meeste onderzoeksnoden zijn gemeenschappelijk voor België (over de verschillende regio's heen), Luxemburg en Denemarken, hoewel elk land/regio zijn eigen accenten heeft. Waar relevant zijn deze verschillen in het rapport besproken.

Een tweede aanbeveling betreft het intensiever samenwerken tussen relevante belanghebbenden: zowel bij het formuleren van onderzoeksvragen, als bij het uitwerken van onderzoek is co-creatie tussen belanghebbenden dé sleutel om tot een evenwichtige verdeling te komen tussen korte- en lange-termijn-issues, tussen toegepast-praktijkgericht en fundamenteel-theoretisch onderzoek, tussen de verschillende schaalniveaus (in tijd en ruimte) en tussen de verschillende sectoren en beleidsdomeinen. Co-creatie bevordert ook de effectieve toepassing en verspreiding van de ontwikkelde kennis. Dit geldt ook voor co-financiering van onderzoek. Deze aanpak vergt meestal wel meer tijd.

Daarnaast benadrukten de deelnemers aan de workshop dat er naast het ontwikkelen van "nieuwe" kennis ook de nodige aandacht moet bestaan voor het beter ontsluiten, verbinden, vertalen, gebruiken en verspreiden van de reeds bestaande kennis. "Knowledge brokers" (of kennis-makelaars) kunnen een coördinerende en faciliterende rol spelen bij dit proces en bij de coaching van kennisgebruikers. De vertaling en verspreiding van de kennis moet gebeuren op maat van de kennisgebruikers. Naast knowledge brokers worden interactieve (digitale) platforms en lerende netwerken van belanghebbenden aangehaald als katalysator voor de uitwisseling van data, kennis en ervaringen.

Op vlak van financiering van onderzoek geven de belanghebbenden aan dat de budgetten dikwijls versnipperd zijn omwille van de versplintering van bevoegdheden en onderzoeksagenda's. Het samenleggen van financiering en fondsen is bijgevolg aangewezen voor groter, geïntegreerd lange-termijn-onderzoek. Onderzoek naar bodem- en landgebruik is momenteel niet populair bij financieringsinstanties: hier is het belangrijk om de meerwaarde van dit onderzoek in de verf te zetten bij de beslissers, bv. door de maatschappelijke kost ten gevolge van niet duurzaam land- en bodemgebruik te berekenen en mee te nemen in beleidsbeslissingen, of door inspirerende win-win-oplossingen (met voorbeelden) te visualiseren.

Een mind shift en de daaruit volgende gedragsverandering worden gezien als dé motor voor verandering. Deelnemers hielden een pleidooi voor het integreren van de sociale wetenschappen bij het onderzoek naar bodem- en landgebruik. Deze reiken stof aan over

het “waarom” en “hoe” dit proces van bewustwording kan bewerkstelligd worden. Het verstrekken van kennis op maat in een aangepaste communicatiestijl zorgt dat het bewustzijn (en van daaruit de stap naar actie) rond duurzaam bodem- en landgebruik bij alle lagen van de maatschappij groeit. Het ondersteunen van pioniers bevordert een snellere transitie.

Tenslotte benadrukten deelnemers dat belangrijke randvoorwaarden het ontwikkelen, implementeren en financieren van onderzoek naar bodem- en landgebruik moeten ondersteunen en verzekeren: een degelijk wettelijk kader, een stabiel politiek klimaat en een regulering van de (economische) markt.

In een vervolgfase van het project zal de verzamelde informatie per land verder verwerkt worden tot een gezamenlijke Europese onderzoeksagenda. Het verdere traject kan gevolgd worden op http://www.inspiration-h2020.eu/.

3.1.3 French version

Établir, mettre en œuvre et financer ensemble un agenda européen en matière d'utilisation du sol et des terres : résumé de la Phase 1 d'INSPIRATION

Les Belges, Luxembourgeois, Danois et Européens affrontent des défis communs pour l'avenir ; pensez seulement au changement climatique, à la garantie de sécurité alimentaire et de sécurité, à un environnement sain, ... L'utilisation du sol et des terres joue souvent un rôle crucial au début d'une transition vers une cohabitation à l'intérieur des frontières de la planète. Du fait des changements dans la démographie et des effets économiques que ceux-ci induisent, la qualité du sol et des terres est soumise à une pression toujours plus forte. Comment nous assurons-nous, en tant que société, que la qualité du sol et des terres soit préservée et que les défis sociétaux soient abordés de manière durable ? Et quelles (nouvelles) connaissances en matière de gestion du sol et d'utilisation des terres sont-elles nécessaires à cette fin ?

Pour trouver une réponse à ces questions, le projet INSPIRATION, un projet de recherche d'une durée de trois ans impliquant 20 partenaires provenant de 16 pays européens, élabore un **agenda stratégique de recherche pour l'utilisation du sol et des terres,** suivant une approche ascendante ('bottom-up'), partant des **besoins des utilisateurs des connaissances et des financiers**. Tant l'acquisition de nouvelles connaissances que la diffusion et l'application de celles-ci sont abordées. Un autre objectif important est la création d'un **réseau** de collaboration et de financement, de manière à ce que l'agenda de recherche soit également effectivement exécuté.

Dans une première phase du projet, les Points Nationaux de Focalisation (PNF) rassemblent, au sein de leur propre pays, les informations nécessaires à l'élaboration de cet agenda de recherche. Ils établissent l'inventaire des Parties prenantes Nationales Clés (PNC), interviewent un certain nombre de ces parties prenantes sur l'état de l'art au sein de la recherche en matière d'utilisation du sol et des terres, effectuent une étude bibliographique et comparent les résultats des interviews et de l'étude bibliographique au cours d'un atelier.

Le présent rapport présente les résultats de la première phase d'INSPIRATION pour la Belgique, avec également des contributions de la part du Luxembourg et du Danemark. OVAM fait office de PNF pour la Belgique. Les interviews ont eu lieu au cours de l'été de 2015 ; l'atelier a été organisé les 29 et 30 octobre à Bruxelles.

Une première constatation est que tant le champ de recherche que le domaine politique sont morcelés en Belgique, en raison de la structure spécifique du pays (un État fédéral composé de 3 communautés (avec leur langue propre) et de 3 régions), certainement sur le plan de la gestion du sol et de l'utilisation des terres. Chaque institution ou administration possède son propre domaine d'expertise ou ses propres compétences, et une vision globale belge sur (la recherche en matière de) l'utilisation du sol et des terres fait défaut. Ce morcellement se fait moins sentir au Luxembourg et au Danemark. Les PNC interrogés s'accordent bien sûr l'importance de l'utilisation du sol et des terres pour affronter les défis futurs : ce rôle est fondamental et est en rapport étroit avec les problèmes sociétaux importants. Une première recommandation est par conséquent d'aborder la recherche en matière d'utilisation du sol et des terres, de manière plus intégrée et plus orientée système et de dépasser ainsi les frontières du champ d'expertise ou du domaine politique propres. Les synergies et compromis entre processus systèmes peuvent être ainsi plus facilement cartographiés et portés en compte. Les connaissances fiables sur les composants séparés d'un ensemble plus vaste restent bien sûr importantes en tant qu'élément du système.

Les besoins actuels et futurs en matière de recherche varient de domaines d'expertise spécifiques, telle l'évaluation des risques pour les sols pollués, à des thèmes plus larges, tels les conflits en matière d'utilisation des terres. Du fait que les thèmes sont liés, un recouvrement, un mélange et une influence entre les sujets interviennent souvent, ce qui complique parfois une description intrinsèque "distincte". En fait, les thèmes, ainsi que les questions de recherche qui leur sont liées, doivent toujours être considérés dans le cadre du système plus large d'utilisation du sol et des terres. La recherche d'une approche intégrée ou de thèmes holistiques, plus horizontaux, est mentionnée comme prioritaire, parce que ceux-ci ne sont pas encore repris, ou de manière limitée, dans l'agenda de recherche actuel et parce que les connaissances nécessaires et l'expertise à ce sujet manquent par conséquent.

La plupart des besoins en matière de recherche sont communs à la Belgique (pour l'ensemble des régions), au Luxembourg et au Danemark, bien que chaque pays/région ait ses propres accents. Ces différences sont commentées dans le rapport, lorsqu'elles sont pertinentes.

Une deuxième recommandation porte sur la collaboration plus intensive entre les intéressés pertinents : tant lors de la formulation des questions de la recherche que lors de l'élaboration de la recherche même, la co-conception entre les intéressés est la clé par excellence pour parvenir à une répartition équilibrée entre questions à court et à long termes, entre la recherche appliquée, orientée vers la pratique, et la recherche fondamentale, théorique, entre les différents niveaux d'échelle (dans le temps et dans l'espace) et entre les différents secteurs et domaines politiques. La co-conception favorise également l'application et la diffusion effectives des connaissances acquises. Ceci vaut également pour le cofinancement de la recherche. Cette approche requiert généralement plus de temps.

Les participants à l'atelier ont également souligné qu'outre le développement de "nouvelles" connaissances, il fallait également attacher une importance suffisante à améliorer le désenclavement, l'interconnexion, la traduction, l'utilisation et la diffusion des connaissances déjà acquises. Les 'knowledge brokers' (ou 'courtiers des connaissances') peuvent jouer un rôle de facilitation et de coordination dans ce processus, ainsi que lors de l'accompagnement des utilisateurs des connaissances. La traduction et la diffusion des connaissances doivent être adaptées aux utilisateurs de celles-ci. Outre les 'knowledge brokers', les plates-formes (numériques) interactives et les réseaux d'apprentissage des intéressés sont également cités comme catalyseurs de l'échange de données, de connaissances et d'expériences.

Pour ce qui concerne le financement de la recherche, les intéressés signalent que les budgets sont souvent morcelés, en raison du morcellement des compétences et des agendas de recherche. La fusion du financement et des fonds est par conséquent recommandée pour une recherche plus vaste, intégrée et à long terme. La recherche en matière d'utilisation du sol et des terres n'est actuellement pas populaire auprès des instances de financement : il est donc important de mettre la plus-value de cette recherche en évidence auprès des décideurs, par exemple, en calculant le coût sociétal de l'absence d'une utilisation durable du sol et des terres, et en en tenant compte lors des décisions politiques, ou en visualisant des solutions gagnant-gagnant inspirantes (avec exemples).

Une évolution des mentalités et le changement d'attitude qui en résulte sont considérés comme le moteur du changement par excellence. Les participants ont plaidé en faveur de l'intégration des sciences sociales dans la recherche en matière d'utilisation du sol et des terres. Celles-ci fournissent des informations sur les raisons et la manière dont ce processus de prise de conscience peut être réalisé. Le fait de dispenser des connaissances sur mesure, dans un style de communication adapté, fait en sorte que la conscience en matière d'utilisation du sol et des terres se développe dans toutes les couches de la société. L'appui aux pionniers favorise une transition plus rapide.

Les participants soulignent enfin qu'une conditionnalité importante doit appuyer le développement, la mise en œuvre et le financement de la recherche en matière d'utilisation du sol et des terres : un cadre légal adapté, un climat politique stable et une régulation du marché (économique).

Dans une phase ultérieure du projet, les informations collectées par pays seront traitées pour parvenir à un agenda de recherche européen commun. La suite du trajet peut être suivie sur http://www.inspiration-h2020.eu/.

3.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for Belgium, with input from Luxembourg and Denmark (see 1.3.1). The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation”.

In a first phase National Key Stakeholders (NKS) were interviewed and a desk study was executed (see 1.3.2). Based on the information collected during the interviews and the desk study, a national workshop was held in Brussels (see 1.3.3.). Next to the Belgian NKS, also NKS from Luxembourg and Denmark participated to the workshop.

Input from Luxembourg and Denmark

Beside the co-creation with the Belgian NKS, we had also the opportunity to invite some NKS from Luxembourg and Denmark to collaborate on the INSPIRATION goal.

For **Luxembourg**, a representative from the public administration Sustainable Development Ministry (Waste Department, Contaminated Sites Service) and a representative from the Luxembourg Institute for Science and Technology were interviewed and participated to the workshop. All the different topics on soil and land use (cfr INSPRATION framework) for Luxembourg were represented.

For **Denmark**, a representative from Danish Regions and Danish Soil Partnership was interviewed and participated to the workshop. Danish Regions is the association of the five regions in Denmark. Its overall mission is to safeguard the interests of the regions nationally as well as internationally. The objective of Danish Soil Partnership is to promote development of solutions to contaminated soil and to market these solutions internationally. The regions are solely tasked with soil contamination. All other soil related issues are handled within the municipal planning regime. Only issues related to soil contamination has been dealt with by the Danish NKS.

Interviews and desk study

In Belgium, 11 NKS were interviewed during the summer of 2015. OVAM interviewed also 2 NKS of Luxembourg. 1 NKS form Denmark filled in the questionnaire and sent it back. Details on these NKS are provided in Annex I. To have a better idea of the country specific Luxembourg’ and Danish’ INSPIRATION topics, the reports of the Luxembourg and Danish interviews are provided in Annex Id.

The desk study was based on documents suggested by NKS. These are listed in Annex II.

National workshop

The Belgian workshop, with input from Luxembourg and Denmark, was organized in Brussels (Muntpunt) on 29th and 30th of October 2015.

Based on the information collected during the interviews and desk study, a larger group of NKS focused on deepening, enlarging, structuring and prioritizing the soil and land use related research needs, the science-policy-interface and the funding and (financial) cooperation topics.

The summary of the workshop program is given in the table below. The list of participants is added in Annex V.

THURSDAY 29/10/2015

12.00-13.00	Registration and sandwich Lunch
13.00-13.30	Welcome and introduction Aim and scope of INSPIRATION Summary information from interviews
13.30-14.00	Introduction workshops Introduction stakeholders
14.00-14.45	**WS1**: World Café Tour on link between societal challenges and soil and land use
14.45-15.00	Coffee break
15.00-15.15	Plenary summary World café
15.15-16.15	**WS2**: Knowledge gaps and research needs
16.15-16.55	Plenary summary WS2 Priority setting on research needs
16.55-17.00	Presentation evening program + next day
17.10	Entrance Muntpunt: start city walk on Soil and Land use in the City of Brussels
19.15	Dinner at Restaurant Toukoul, Lakensestraat 34, Brussels

FRIDAY 30/10/2015

9.00-9.30	Welcome to new guests, Summary day 1 Introduction day 2
9.30-10.30	**WS3**: Parallel sessions on - Interface science-policy - Funding and (financial) cooperation
10.30-11.00	Coffee break
11.00-12.00	Reporting on WS3 Discussion, suggestions, questions, good practices, link with INSPIRATION
12.00-12.10	Next steps and follow up
12.00-13.00	Sandwich lunch

3.3 Research and Innovation (R&I) needs

3.3.1 Societal challenges and needs

We strive toward knowledge, always more knowledge, but must understand that we are, and will remain, surrounded by mystery. (Marcelo Gleiser)

The INSPIRATION strategic research agenda aims to contribute to tackle societal challenges related to soil and land use.

As a first part, the societal challenges and their link to soil and land use are explored.

H2020-challenges listed by the European Commission

Horizon 2020 reflects the policy priorities of the Europe 2020 strategy and addresses major concerns shared by citizens in Europe and elsewhere.

For the INSPIRATION project, the H2020 strategy will focus on the following challenges:

- Contribute to food security and food safety;
- Ensure secure supplies of safe drinking water;
- Secure energy supply and distribution;
- Reduce raw material and resource consumption, Ensure efficient use of natural resources;
- Contribute to climate change mitigation and societal adaptation;
- Contribute to a healthy living environment;
- Ensure secure infrastructure

All interviewees affirmed the challenges listed by the European Commission (EC) for the H2020-program as rather complete and all mentioned challenges as important.

The following challenges were stressed by the interviewees as very important or reported as missing in the list:

- How to **integrate** the different EC-challenges into "**one global long term vision**"?
- It is important to take into account the **"dynamic" megatrends and (direct and indirect) drivers** who will influence all challenges (cfr. "*Megatrends*", John Naisbitt). In the report "*Megatrends, far-reaching, but also out of reach? How do megatrends influence the environment in Flanders?*", the Environment Report Flanders (MIRA) identifies the six following **global megatrends**:
    - **changing demographic balances**
    - **accelerated technological developments**
    - **growing scarcity of raw materials and other resources**
    - **growing multi-polarity in society**
    - **climate change**
    - **increasing vulnerability of systems**

The megatrends influence our environment mainly through four societal systems: spatial planning, mobility, energy and production and consumption.

- Water (not only drinking water, but also irrigation and production water)!
- Climate adaptation
- Urbanization and growing cities
- Wellbeing and life quality in the city
- Efficient infrastructure
- Reducing fragmentation and dealing with the scarcity of (suitable) land for different land uses
- Protect soil and land as a primary challenge (not only indirectly)
- Protection of ecosystem services
- Safeguarding biodiversity and nature (habitats) for future generations
- Jobs and job creation are not mentioned in the EC-list
- Mobility (as an activity, not only infrastructure) is not mentioned in the EC-list
- Changing demography as an important driver!

Connection between societal challenges and soil and land use issues, mentioned during the World Café Tour in the Workshop in Brussels

During a World Café Tour, workshop participants became acquainted with each other and debated how to link the H2020 societal challenges with aspects of soil and land use (such as agricultural practices, contamination,…).

The fundamental role of soil and land use and the intertwining of all different aspects were stressed.

The following soil and land use issues were named in relation to the listed H2020 societal challenges:

1) Contribute to food security and food safety

Different (political) choices (or combinations of choices) on soil and land use can/have to be made, each with their own impact (which needs to be assessed in order to know the consequences and societal costs; and to make the right decisions), e.g.:

- Globalization (dependency e.g. on world market) versus self-sustaining regions (independency) => soil quality needs to be and stay high enough
- Land market regulation versus protection of commons: this requires political choices => which outcome is best for a healthy soil? How to assess the impact of the chosen land use?
- Land use: share (mixed use) versus spare (mono use): when to apply multi-functionality and when not?

- Agro-industry and intensification (high energy) versus agro-ecology and extensification (less energy)
- Use of agricultural land: bio-fuel versus food
- For low quality agricultural land, it's better to look for alternative land use instead of classic agriculture (with high demands of input), e.g. sheep in combination with energy production.
- Attention for prevention at the land management level is important in order to avoid pollution (soil, groundwater, sediments)
- Taking into account the scarcity of land, it is appropriate to consider the use of urban land for urban related farming and local food production. There is a need to focus also on prevention on food waste.
- Soil health and soil security on the long term are necessary for healthy food.

2) Ensure secure supply of safe drinking water

Prevention (e.g. to avoid pollution) is important to ensure supply of safe drinking water and needs to be incorporated in each land management plan:

- Need for clean land use (no use of hazardous chemicals): e.g. nature + extensive agriculture + tourism: cfr. Happy meat (France)
- Need to protect recharge areas for drinking water
- The opportunity for PES (payment for ecosystem services) needs to be taken into account (cfr. water company Vittel pays farmers in the neighborhood to avoid use of harmful products on their fields)
- The agro-industry sector, but also individual behavior of civilians and public authorities, use pesticides, other chemicals, … which cause problems at the water purification stations.
- Knowledge on contaminants needs to be developed and used:
- Scientifically motivated threshold values – where needed locally adapted
- New chemicals (e.g. TBT, flame retardants) and their sources
- Existing point sources
- Impact over (long) time !! (e.g. for diffuse pollution which is difficult to remediate or to manage)
- Soil sealing and compaction are important issues.

3) Ensure efficient use of natural resources (e.g. green, wood, thermal energy, ore, gravel, …)

- Sustainable use of soil and land has to take into account soil fertility and soil productivity
- Recycling and re-use of land (e.g. brownfield regeneration)
- Interim (temporary) use: temporary beneficial use of derelict and (low) contaminated land. Preparing for higher quality and sustainable functions.
- For the good understanding of all soil properties and nutrients (biogeochemical processes): a holistic vision is needed !!!
- Laws and legislative framework needs to be adapted to local soil diversity and has to be flexible (adaptable to new knowledge).

4) Secure energy supply and distribution, related to spatial planning

- Food-feed-fuel-fiber: what to choose for land use on arable land? What are tradeoffs? What is sustainable use? What is the policy and knowledge on the different scales (e.g. in Belgium)? What land management is needed?
- Forests can supply wood which implies slow energy production and multifunctional land use
- Solar panels take land for solar energy production which implies fast energy production and monofunctional land use
- Concerning slightly contaminated land (e.g. brownfields, landfills): more pilots and case studies based on applications of the Life Cycle Assessment (LCA) method could be an effective strategy to benchmark environmental synergies and tradeoffs and exploit the opportunity to use phytoremediation or Miscanthus (elephant grass) for energy crops
- It is important to avoid taking good arable land for energy supply and distribution
- Integrated approach and optimization is needed to tackle complex societal challenges: at this moment there is the perception that (EU) leadership for these topics is lacking.
- Look for opportunities in decentralized and local energy supply and storage (biomass (e.g. on landfills), (deep) geothermal energy) in function of soil quality and land use

5) Reduce raw material and resource consumption

- Here again the use of LCA and related methodological infrastructure could be a solution to assess environmental synergies and tradeoffs of different solutions over time
- Look for opportunities to recycle (C2C) excavated sand, clay, gravel,… . This will result in less landfills and more circular economy (e.g. use as building material). Excavating soil and dumping it results in loss of resource.
- Landfill mining
- Be aware for green washing
- Brownfield remediation avoids greenfield take and can be (part of) the solution for land scarcity and speculation on greenfields. However this implicates that (part of) the land management should be in hands of authority? There is need for a policy tool (e.g. “exchange-database”) that helps to easily exchange and trade parcels of land.
- Passive housing and eco-neighborhood promotes and support denser living and energy saving which is more efficient.
- Need to promote and support composting (recycling own biowaste in the garden or in green management) instead of using imported peat soil from Lithuania (which destroys carbon storage in soil)
- Use waste for stabilization of pollutants on site
- Re-use sediments as secondary resource instead of primary resources
- Re-use and recycling of soil nutrients or nutrients from wastewater

6) Ensure secure infrastructure

- Climate change will give birth to sea level rises and salinization of the land and groundwater.
- Landslides due to climate change
- Climate change results in more flooding. More dredging is needed and sediment export to the Netherlands.
- Climate change result in heat effects in cities. Infrastructure should be adapted to reduce the impact of heat stress.
- Radiation effects of power lines.
- Prevent erosion in order to protect residential areas from soil and mud flows.
- There is a clear link between secure infrastructure and spatial planning. Proper land management is the key.
- Regarding underground infrastructure there is a link between soil quality and spatial planning.
- Example of societal challenge related to secure infrastructure: Antwerp Ringland (covering of highway to avoid particulate matter and dust in air of city residential area)

7) Contribute to climate change mitigation and societal adaptation

- C-storage can be provided and fostered by e.g. soil, woods, proper farming practices
- Green corridors and blue-green networks (water) can regulate temperature and heat stress in cities
- Smart spatial planning and smart distribution of human activities (e.g. smart mobility) gives birth to less CO_2.
- Proper farming practices (e.g.no tillage) keep C and nutrients high enough and keep drainage high enough.
- The sea level rising due to climate change has effects on hydrology (e.g. more flooding).

8) Contribute to healthy living environment

- Recent research confirm the strong link between mental health and “green” land use (green area, nature, water)
- Compact cities can result in less polluting mobility.
- Less polluted soils and less waste contribute to a healthy living environment.
- Organic farming contributes to healthy food.
- Good working and healthy ecosystem services (e.g. filtration of water, purification of air, …) contribute to a healthy living environment
- Green corridors could act as buffer to land use conflicts.
- Buffering capacity of soil

9) Protection of nature, ecosystems and biodiversity

- There is a clear link between soil diversity and soil history on the one hand and biodiversity on the other hand.
- Taking into account the value of (soil) ecosystem services can raise awareness and evidence the external benefits to society
- Land and soil should be considered as a valuable common
- Soil legislation
- Integrate policies and spatial planning

During the World Café Tour, it became clear that soil and land use are fundamentally related to all societal challenges. This intertwining shows and reveals the need to connect and to transcend the different scientific disciplines and to merge soil and land use related research topics into a system focused approach.

It was also stressed that it is very important to take into account the different scales (in time and space) of soil and land use: on each scale other processes, other legal frameworks, other stakeholders, … could be of importance.

3.3.2 Topics / research needs to include in the SRA

In the next step Belgian, Luxembourgish and Danish NKS listed the topics and research needs/questions that are to be included in the SRA.

Research topics and research questions should be as good as possible ordened or connected to the four integrative themes of the INSPIRATION conceptual model (see chapter 1). This proposed ordening of the research questions will be given in the text below, indicated in italic.

***Demand** related topics and questions will be indicated in red, **natural capital** in green, **land management** in blue and **impacts of land management** in purple. If the topic or question is related to all four integrative themes, it will also be indicated.*

In the text below, all research topics and research questions, related to soil and land use, that were mentionned during the interviews or workshop, are described using a small narrative. In the narrative, we try to introduce the "**why**" and the "**what**" of each topic, followed by more detailed research questions.

BE-1: Long term monitoring of the soil (or soil-sediment-water) system (as an important part of natural capital)

Long term monitoring and data collection of the soil-sediment-water-system (SSW), including the related SSW-system mechanisms and processes, is needed, e.g. to monitor the natural state of the SSW-system and the impact of climate change, land management practices, land use changes, … on the SSW-system in order to take the appropriate (policy) decisions, measures and the evaluation of these measures. This monitoring includes:

- chemical, physical, biological soil parameters (e.g. organic carbon, pH, CEC, nutrients, moisture content, biodiversity, C-storage, ..)
- contamination parameters (e.g. heavy metals, emerging contaminants, …)
- large scale and long term
- using a harmonized and optimal methodology
- guaranteeing good quality data
- within all of Europe

Research questions:

*The following research questions on monitoring are **relevant to all four integrative themes**: the monitoring can (depending on the topic) give necessary information about the demand – the natural capital – the land management and impact of land management.*

Data mining: Which data are necessary and/or useful? How to collect them (cfr representativity, taking into account heterogeneity and variability)? How to interpret the collected data and draw conclusions resulting in measures?

Which are proper target values or threshold values for each of the parameters measured (for the different soil types and for the different land use and vegetation types, e.g. for habitat restoration)?

New reliable, validated, efficient, cheap and quick screening and detection methods for all monitoring parameters (e.g. using field test kits) need to be developed. How to set priorities?

BE-2: Further research on the survey and risk evaluation of contaminated soil, land, groundwater, sediment

A lot of knowledge related to the survey and risk evaluation of contaminated land is already available, but should be continuously updated, fine-tuned and disseminated in order to keep the implementation (including policymaking) appropriate, cost-effective and capable to tackle possible risks for human health and environment due to contamination.

Research questions:

The following research questions are relevant for either natural capital (cfr. historical contamination), land management (cfr. prevention of contamination) and impact of land management (cfr. contamination due to ongoing land management practices).

New (cheap, efficient, quick, validated and reliable) innovative screening methods for sampling and analysis (additional to the “classic” methods) need to be developed. How to integrate the different detection methods to have a proper and “combined” view of the contamination? How to use statistics to determine the proper number and location of samples and analysis (cfr representativity, taking into account heterogeneity and variability)? Which methods for “passive” sampling (taking into account bioavailability)?

How to fingerprint (e.g. determination of age) sources of contamination in mixed plumes?

Sampling and analysis methods for detection of “new” contamination parameters, e.g. for tar, dioxins, other “new” emerging contaminants, … need to be developed.

Updated and harmonized models for human and ecotoxicological risk evaluation for contaminated land, sediment need to be developed: including updated and refined toxicological and dispersion parameters (e.g. on bioavailability, vapor intrusion due to changed building regulations (cfr. fresh air tube in Luxembourg), natural attenuation, flux groundwater-surface water), updated exposure models, new chemicals, … .

How to deal with uncertainties related to risk assessment?

Should methods and models for risk evaluation be harmonized within Europe? How?

Should threshold values be harmonized within Europe? How?

How to take into account combination toxicity (mixed contamination parameters)?

How to eliminate risks due to vapor intrusion into building with sensitive use?

How to refine the modeling of interaction (e.g. chemical erosion) and dispersion in the groundwater-sediment-surface water interface? How to define the spreading and “in situ” risks and need for remediation?

How to raise awareness for the possible risks due to soil contamination (e.g. in vegetable gardens)?

How to survey (and remediate) groundwater contamination (e.g. VOC, pesticides) in limestone aquifers?

BE-3: Research on diffuse contamination (i.e. contamination not directly linked to a known source, e.g. dioxins, nitrates, pesticides and its metabolites)

Diffuse inputs of contamination parameters to soil, sediment and groundwater can be of various nature and is in most cases not directly linked to a known source. Typical (both historical and actual) inputs resulting in diffuse SSW contamination are:

- Agricultural practices; i.e. direct input of nutrients (fertilizers) and pesticides, application of sewage sludge and manure.
- (Historical) Atmospheric deposition of exhaust gases and particles from vehicles and industry.
- Sedimentation of diffuse particles from waste water discharges in surface waters
- Very local sources (use of material (e.g. ashes), uncontrolled excavations and refillment (e.g. using excavated soil and sediments), (carelessly) use of harmful products by citizens, professionals (e.g. pesticides, cosmetics, pharmaceuticals, …)

Major impacts of (both historical and actual) diffuse inputs to soil, sediment and groundwater could be:

- Decrease of soil quality and possible risks for humans and environment
- Decrease of groundwater quality due to leaching processes of nutrients, organic matter, pesticides and other pollutants
- Decrease of sediment quality due to deterioration of water quality and import of polluted material
- Eutrophication of surface waters due to sedimentation processes[6].
- Diffuse contamination forms a major threat to the drinking water availability on the long term.

Research questions:

The following research questions are relevant for either natural capital (cfr. historical diffuse contamination), land management (cfr. prevention of diffuse contamination) and impact of land management (cfr. diffuse contamination due to ongoing land management practices).

How to prevent, map and monitor, evaluate risks, remediate or manage diffuse contamination in soil, groundwater and sediments?

How to set priorities in research and monitoring?

How to balance intense land use and agriculture, and drinking water production?

How to set up a plan of action to tackle diffuse pollution of soil, sediment and groundwater on the local, on catchment areas (for drinking water) and regional scale?

[6] EUGRIS portal site

BE-4: "New", non-common measured or "Emerging Contaminants" in soil, groundwater, sediment

Definition of Emerging contaminants by the United States Geological Survey: "Any synthetic or naturally occurring chemical that is not commonly monitored in the environment but has the potential to enter the environment and cause known or suspected adverse ecological and(or) human health effects".

The major sources of environmentally relevant emerging contaminants are primarily wastewater treatment plants effluents, and secondarily terrestrial run-offs (roofs, pavement, roads, agricultural land) including atmospheric deposition. Characteristic of some contaminants is that they do not need to be persistent in the environment to cause negative effects since their high transformation/removal rates is compensated by their continuous introduction into the environment. For most of the occurring emerging contaminants, risk assessment and ecotoxicological data are not available and therefore it is difficult to predict which health effects they may have on humans, terrestrial and aquatic organisms, and ecosystems. Also the budgets (sources, entry routes, and fate) for environmental pollutants would be of importance7.

When migrated to surface and groundwater, new or emerging contaminants form a threat to the drinking water production on the long term.

Research questions:

The following research questions are relevant for either natural capital (cf. historical contamination due to emerging contaminants), land management (cf. prevention of contamination due to emerging contaminants) and impact of land management (cf. contamination due to emerging contaminants in relation to ongoing land management practices).

Knowledge on physicochemical properties and risks of "new" (emerging) contaminants (e.g. cosmetics, pharmaceuticals, pesticides, …) is often not available and is needed: (eco)toxicology, bioavailability, combination toxicology, behavior, sources, pathways, impact, remediation technology, …

Sampling methods and suitable analytical methods (low detection limit) are often not available and are needed

Collection monitoring data (in soil, groundwater, sediment) is needed to check the evidence in the real environment.

How to set priorities in the research and monitoring for the most critical parameters?

How to set "threshold values" (if necessary)?

How to remediate these "new" (often persistent and mobile) parameters?

How to prevent and remediate contaminated soils, groundwater, sediments?

How to raise awareness at the producers and consumers (of the products containing emerging contaminants) (e.g. appropriate use of products, …)?

How to estimate the risks of new or emerging pollutants for drinking water production?

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7 EUGRIS portal site

BE-5: Remediation technology for contaminated soil, groundwater, sediment

A lot of knowledge related to remediation technology of contaminated land is already available, but should be continuously updated, fine-tuned and disseminated in order to keep the implementation (including policymaking) sustainable, cost-effective and capable to tackle possible risks due to contamination.

Research questions:

Demand

The combination of soil and sediment remediation with other activities (e.g. energy production) could give a positive imago to remediation actions which are usually only considered as a “cost”. It can also inspire and convince “less experienced” countries/regions/enterprises to start with remediation. What kind of research is needed to develop and test the win-win-situations and disseminate the knowledge and inspiring examples?

Land Management

How to optimize existing and innovative remediation technology for contaminated soil, groundwater, sediment (e.g. for big urban VOC-plumes, e.g. for low permeable geology, e.g. cleaning soil contaminated with multiple parameters,…)?

How could phytoremediation/mycoremediation/bioremediation be used to remediate or manage contaminated soil, groundwater, sediment (long term management)? How could naturebased solutions (inspired by nature e.g. enhancing/using soil biodiversity) be useful and how can they be incorporated in the remediation process (long term remediation, management or restoration)?

Impact of land management

How to make remediation of contaminated soil, groundwater, sediment more sustainable and cost-effective (e.g. lower energy consumption, cleaning of soil, …)?

BE-6: Integrated approach remediation - spatial planning (e.g. brownfield development, landfill mining)

Land is a limited natural resource. An integrated approach of the remediation of contaminated land can help create sustainable solutions (elaborated in co-creation with all stakeholders) by ensuring that economic, social and environmental issues are tackled through integrated strategies for renewal, regeneration and development in both urban and rural areas, e.g. brownfield development which can help protect the conservation of greenfields, urban forestry, …. Landfill sites can be considered as a specific kind of brownfields and should by consequence be addressed in a more specific way, namely as a resource of materials, energy and land.

Research questions:

Demand

How to integrate and optimize the remediation of contaminated land in spatial planning processes? How could spatial planning take the contamination of the site into consideration, thus allowing for more optimal redevelopment?

How to set up a landfill management plan that provides optimal use and protection during the period of non-mining. Cost-effective interim measures as alternative to high containment costs.

Land Management

What kind of knowledge is needed to stimulate the reactivation of brownfields (e.g. for urban forestry) rather than developing green field sites. How can we stimulate the protection of greenfields? How to implement and apply existing knowledge on brownfield redevelopment? How to develop flexible instruments?

How can we involve all stakeholders (e.g. municipalities, real estate, …)?

Could we grow “usable and sustainable” energy crops on contaminated land? How?

BE-7: Integrated approach spatial planning in relation to soil and subsurface

Facing a denser population and a more complex society, more and more activities will take place in the subsurface (e.g. infrastructure facilities, water supply, electricity, sewer system, …). A sustainable use of the soil (and subsurface) contributing to tackle societal challenges without losing soil quality and the natural soil services is needed.

Research questions:

Land Management

How to integrate and optimize subsurface activities (e.g. remediation, infrastructure facilities, subsurface buildings, sewer system, …)?

BE-8: Innovative funding systems for remediation / restoration / brownfield development / landfill mining…

In some cases the costs for the remediation or restoration of contaminated of degraded land or sediments are too high for a private owner or for public agents. This results in land or soil and sediments that is not remediated or not restored, even if this remediation or restoration would be very valuable for society.

Research questions:

Land Management

Can we develop an innovative funding system allowing support for those remediation or restoration projects for which the costs are exuberant or exceed the initial expectations? Or for those projects where “economic” value is not the main driver (e.g. remediation or restoration in small nature areas)?

BE-9: Excavated soil/sediment

Excavated soil or sediment can be used as building material instead of primary raw materials. On the other hand can the unsafe reuse of contaminated excavated soil and sediment give birth to diffuse contamination.

Research questions:

Demand

How to use excavated soil/sediment as secondary raw material?

Land management

How to guarantee and monitor a safe reuse (regarding the current lack of traceability of excavated soil/sediments)?

BE-10: Organic carbon (OC) in soil

Soil organic carbon plays an important role in soil fertility and soil health; and plays also a key role in the carbon cycle, and thus it is important in global climate models.

Research questions:

Natural capital

Models calculate the C-evolution in soil. How should the model results be monitored in the field allowing an evaluation of these models?

How can soil help to reduce the impact of climate change?

LULUCF: mapping Land use, Land use Change and Forestry on European level:

- Data on land use and on land use change
- Data on the evolution of C in soil
- How to process and analyse these data? How to conclude on measures needed?

The C-storage capacity of specific soils needs to be quantified.

Land management

What kind of measures do we need to, on the one hand keep organic carbon high enough (to preserve the soil health) and on the other reduce the impact on climate change? And this taking into account the different kinds of organic carbon and its different roles (storage C, soil fertility, …).

Impacts of land management

What is the impact of land use changes on (changes in) of OC (and on soil fertility, erosion)?

What is the impact of the manure policies and legislation (limitation of manure use on land) on OC?

A large quantity of biomass is used for the generation of "green" energy but due to that, biomass is not returning to soil, resulting in an impoverishment of the soil. In regard to the potential conflict between food supply and energy need, impact of the loss of biomass needs to be assessed. Which quantity of biomass can be exploited keeping the soil quality? Which practices to choose?

BE-11: Conservation soil fertility

Soil fertility refers to the ability of a soil to sustain plant growth, i.e. to provide plant habitat and result in lasting constant yields of high quality. In lands used for agriculture and other human activities, soil fertility typically arises from the use of soil conservation practices and their impact on the long term.

Research questions:

Land management

How to conserve the fertility of soil in the long term?

BE-12: Erosion

Due to erosion in Flanders, a lot of fertile soil is lost resulting in less fertile arable land on the longer term. The washed away soil and mud enters in the sewer systems and the residential areas resulting in high clean-up costs.

Research questions:

Land management

A lot of erosion research has already been done or is ongoing:

- How to restore degraded soils? What are the actual knowledge gaps?
- How is the knowledge on measures to reduce erosion implemented (or not)? Which measures could be implemented by farmers or by other stakeholders?

How can research and research findings be translated into layman's terms in order to foster the implementation of results and suggestions for action? How can we stimulate its implementation?

BE-13: Soil sealing (covering of the ground by an impermeable material)

The increased sealing of (former) fertile soil, especially in cities, causes a degradation of soil fertility and thus impedes food production. The ecological soil functions are severely impaired or even prevented (e.g. soil working as a buffer and filter system or as a carbon sink). In addition, surrounding soils may be influenced by change in water flow patterns or the fragmentation of habitats. Current studies suggest that soil sealing is nearly irreversible.

Research questions:

Land management

How can we develop a policy to prevent soil sealing? How can we integrate these policies in spatial planning processes?

Does a technological solution exist?

Impacts of land management

How can we raise awareness around soil sealing issues?

BE-14: Soil compaction

Soil compaction is a form of physical degradation resulting in densification and distortion of the soil where biological activity, porosity and permeability are reduced, strength is increased and soil structure partly destroyed. Compaction can reduce water infiltration capacity and increase erosion risk by accelerating run-off. The compaction process can be initiated by wheels, tracks, rollers or by the passage of animals.

Research questions:

Land management

How can we develop a policy to prevent soil compaction or to restore soils after compaction? How can we integrate these policies in spatial planning processes or land management practices?

Can we think of innovative ways to cultivate the land without having to use heavy machinery (e.g. the use of drones,…)

Impacts of land management

In order to change the behavior of farmers, foresters and policy developers we need to raise awareness on the issue of soil compaction. How can we do this efficiently and effectively?

BE-15: Water retention capacity of soil

Soil water retention is a major soil hydraulic property that governs soil functioning in ecosystems and greatly affects soil management. Soil moisture forms a major buffer against flooding, and water capacity in subsoil is a major steering factor for plant growth. The effects of changes in soil water retention depend on the proportions of the textural components and the amount of organic carbon present in the soil. Maintaining or even enhancing the water retention capacity of soils can play a positive role in mitigating the impacts of more extreme rainfall intensity and more frequent and severe droughts, e.g. due to climate change.

Research questions:

Land management

How to safeguard the sponge function of the soil?

How to foster/upgrade the water retention and water infiltration capacity of soil?

BE-16: Soil and sediment ecosystem services

Soil and sediment as an important part of our natural capital are providing a lot of ecosystem services to society. These ecosystem services are relevant to grand challenge areas: e.g. climate change adaptation and mitigation, food and energy security, water protection, biodiversity and genetic pool for human health, ecological sustainability, cultural heritage. It is necessary to increase the awareness on the importance of the soil (and sediment) ecosystem and their services, showing their value for society, the need for protecting (and restoring) this values and make a more sustainable and efficient use of it, as part of the natural capital for the actual and future generations.

There should be made a clear link to the existing initiatives on MAES and TEEB, which are addressed both through national efforts of each Member States and the European Commission, via also some ongoing H2020 projects. New knowledge should be built upon existing knowledge...): http://biodiversity.europa.eu/topics/ecosystem-services; etc.

Research questions:

Natural capital

How to raise awareness on the importance of soil, sediment and their (ecosystem) services? How can we highlight its/their positive and fundamental role in order to protect (and restore) them?

How to map and assess soil ecosystem services?

How to value soil ecosystem services?

All stakeholders (including policymakers) need to take into account the value of the different soil ecosystem services in their processes and projects: how to do that?

BE-17: Recycling of soil nutrients

Plant nutrients are chemical elements that are mostly absorbed by plant roots as inorganic chemicals dissolved in water. At the same time, plant nutrients are used by other forms of life and go through many biological transformations that determine when and how plants take them up. Biological materials like manure are major nutrient sources on many "conventional" farms, as well as organic farms, while inorganic minerals (chemical materials) like rock phosphate and lime are acceptable fertility amendments for certified organic production. Understanding soil nutrient recycling processes helps identify practical options that fit different farming systems. Understanding nutrient cycles helps all types of farmers maintain the fertility of their soils, while at the same time protecting our water resources.

In Flanders most soil nutrient recycling challenges are focused on manure.

Research questions:

Land management

How to process manure to recycle nitrogen (N) and phosphorus (P)? Which techniques and methods can be used to remove P (and N) from manure?

Impacts of land management

What is the impact of the manure policies and legislation (limitation of manure use on land) on N and P?

What is the relation between soil nutrients and the health value of food?

Phosphorus saturation

Sandy soils in Flanders have a high content in phosphorus.

Demand and Natural capital

What are the optimal P-levels in different soil types and for different land uses?

What is the behavior of P in sandy, loamy and clayey soils? What is the effect of the saturation in the long term? We need more data about this topic.

Which analyses and extraction methods/protocols should be used to map the P-concentrations in soil in a harmonized and proper way, and this in function of pH and soil texture?

Land management

In other regions in Europe or on a mondial scale, there is a deficit in P. How can the P in Flemish soils be recycled? Which “remediation technology” is the most suitable to reduce the amount of P in soil?

Nitrogen saturation

Natural capital

What is the link between N-deposition and biodiversity? What are possible effects in both the short and long term? We need more data .

BE-18: Soil biology and soil biodiversity

Soil biodiversity is the driving force behind the regulation of soil ecosystem services. Many of the functions performed by soil organisms can provide essential services to human society. Most of these services are supporting services, or services that are not directly used by humans but which underlie the provisioning of all other services. These include nutrient cycling, soil formation and primary production. In addition, soil biodiversity influences all the main regulatory services, namely the regulation of atmospheric composition and climate, water quantity and quality, pest and disease incidence in agricultural and natural ecosystems, and human diseases. Soil organisms may also control, or reduce environmental pollution (bioremediation). Finally, soil organisms also contribute to provisioning services that directly benefit people, for example the genetic resources of soil microorganisms can be used for developing novel pharmaceuticals.

Soil biodiversity is threatened due to soil degradation, land use management, climate change, pollution by chemicals and GMO's and invasive species. This decline leads to high societal costs. For instance, the consequences of soil biodiversity mismanagement have been estimated to be in excess of 1 trillion dollars per year worldwide.

Research questions:

Demand

What is the potential of soil biodiversity for the development of new pharmaceuticals?

What kind of soil biodiversity is important for the farmer?

Natural capital

How to sample, analyse and evaluate (the status of) soil biodiversity? How to extrapolate field data?

How can we visualize and communicate the role of soil biodiversity to stakeholders in the agricultural sector in order to make its importance easily understood?

Land management

How to protect/restore soil biodiversity?

Impacts of land management

What is the role (and impact) of soil biodiversity on agricultural processes? And vice versa? What is the impact of agricultural practices on soil biodiversity?

Is the bioavailability of soil nutrients (e.g. P) influenced by soil life / soil biodiversity? And vice versa. How is this different in manure or chemical fertilizers?

BE-19: Remediation of "agricultural" contamination (phosphorus, nitrogen, pesticides)

Agricultural land with too high concentrations on N, P or other parameters should be remediated of managed in order to reduce risks and restore a good soil quality.

Research questions:

Land management

How to avoid too high N-levels in soil through N-deposition and manuring. How to remediate contamination linked to agricultural activities (P, pesticides, …)?

Could naturebased solutions be used to remediate agricultural contamination?

BE-20: Integrated pest management – Use of pesticides, herbicides, …

Integrated pest management, or IPM, is a process that can be used to solve pest problems while minimizing risks to people and the environment. IPM can be used to manage all kinds of pests in urban, agricultural, and wild land or natural areas.

Research questions:

Land management

How to grow crops – vegetables making use of integrated pest management and reducing the use of harmful pesticides, herbicides? Especially for specific less cultivated crops (some vegetables, fruits, …).

How to raise awareness and lower the use of herbicides, pesticides at the citizen, allotment and public services level?

Impacts of land management

How to link integrated pest management to the effects on the structure and function of the soil food web.

BE-21: Pressure on land and spatial planning, fragmentation of land, scarcity of land

Land is a limited resource. The countryside is urbanizing (urban sprawl). Farmers need more land to upscale their production. Land prices are rising and access to land is getting more difficult for some parties (e.g. “new” farmers).

Research questions:

Demand

Which land is best/not suited for which agricultural use? A lot of knowledge is available, but is not disseminated or implemented to the relevant stakeholders. How to disseminate? How to exchange knowledge and data?

Land management

How to reduce the pressure on land? How do we deal with the available area of land/soil, to what use will we give priority and which not? How to link spatial planning with environmental concerns and raise awareness? How to keep the resilience on and resistance to the use of land, which is e.g. important for climate change? Which policy tools are needed?

What (and how) could prevent society from losing its good agricultural soils (by combining science, laws, social sciences, economy, …)?

How to make efficient and effective use of the available land? E.g. making use of roofs for greenhouse farming? Which technologies are needed?

How to stop fragmentation of land?

Land prices (e.g. for public nature, agriculture or public recreation areas) are rising due to private landowners buying big parcels of land. What is the impact of this process on private plots of natural land (private landowners)? Can we assess and calculate this impact?

BE-22: Conflicts on land use

An increasing demand on land causes conflicts in land use resulting in pressure on land (use) in Belgium, with possible impact outside Belgium.

Research questions:

Impacts of land management

How to avoid land conflicts and to provide righteous access to land? How to find an equilibrium between the different land use types? Need for sociological research (e.g. role of difference in cultures, role of wellbeing, relation green/wellbeing/area for recreation/criminality/hospitals, …). What kind of sociological research is needed?

How should we assess the environmental impact (e.g. on water and soil quality) of the different kinds of land use in terms of costs on society (cost/benefit analysis), (e.g. costs to purify contaminated drinking water)? How to take into account the results of these assessments?

Should we distribute certain high impact economical activities (e.g. cattle breeding) over Europe? If yes, how should this be done?

Can we think of decision making tools that allow us to determine which land should be used for specific functions, e.g. biomass production, food production,…? What are advantages and trade offs of the different choices in land use? How can we take into account the impact of a certain land use beyond the regional boundaries? How to make balanced decisions and how to set priorities? Should former farmhouses that are no longer active in the agricultural field be redeveloped (and house new functions, e.g. recreation, care (for the elderly),…) or do we pull them down?

BE-23: Agricultural practices and land management

Land management systems and agricultural practices should take into account the actual situation of the soil and the impact of the practices or management systems on the soil and the environment (also on the long term). Knowledge is available but not always satisfactorily distributed and applied.

Research questions:

Land management

Can we integrate the existing knowledge in the educational practice of e.g. (urban) planners, agricultural sciences, etc…? How can this knowledge be translated into laymen terms that make them more accessible to the agriculture sector?

How to realize sustainable intensification in agriculture?

How to process manure in such a way that it is better absorbed by the soil with less “leaching”?

How to process compost or the recycling of bio waste in the most suitable, practical and cost effective way?

How to make horticulture (vegetables) more sustainable (e.g. less soil compaction due to intensive farming, less use of pesticides, less erosion)?

How to make irrigation and drainage more effective and sustainable (e.g. less impact on soil biodiversity, less leaching of nutrients)?

Impacts of land management

How should we assess the environmental impact (e.g. on water and soil quality) of the different kinds of land management practices in terms of costs on society, e.g. the cost to society on loss of soil fertility, soil biodiversity or food health by some unsustainable or harmful agricultural practices? How to take into account the results of these assessments?

BE-24: Spatial planning

Flanders (and Brussels) is characterized by intensive soil sealing and fragmentation. Spatial policy in Flanders is facing a number of societal challenges. The population is expected to grow from 6 to 7 million, so the pressure on the space will not be reduced. It is necessary to think how a high-quality open space, good mobility and space for renewable energy production can be provided. How can we prevent floods, protect food production and offer investors and businesses the space that's needed to keep the Flemish (and other) region competitive?

Research questions:

Demand and Natural capital

How to integrate the "dynamic" societal flows (e.g. temporary and/or multiple use of space or land, mobility, energy flows, waste flows, …) into the more "static" natural system of soil and land use?:

- How to collect dynamic data on multiple and flexible land use, temporary land use (e.g. pop up activities in cities, temporary nature)?
- How to collect dynamic and accurate data on "flows" and "logistic networks": e.g. energy, transportation and mobility (people, goods), circular economy, resources, waste, …? How to develop a dynamic model that visualizes and monitors changes? Based on this model policymakers can make better decisions.

These dynamic data are necessary to develop and follow up a good policy about spatial planning and land use.

Land management

Can we translate the fundamental knowledge about land use and land use planning into practical knowledge that can be easily and readily applied? What kind of tools can be used by stakeholders on different levels (e.g. policymakers, cities, …)?

How to develop decision supporting tools to optimize land use and spatial planning, taking into account different societal needs at system level (e.g. mobility, water management, agriculture, residential areas, industry, nature, recreation, …)?

Impacts of land management

How to coach and support policymakers on different levels to be able to calculate/see the impact of their policy decisions on spatial planning? The research demands of those who need the support and coaching should be central.

BE-25: High tech monitoring and data collection

The need for technological development, e.g. in agriculture to achieve "sustainable intensification", is on the agenda of governments and international bodies. Innovation is also at the centre of the EU2020 strategy. New technologies and their adoption by e.g. EU farmers are considered as key drivers in maintaining European agriculture competitive in a global world. While the potential of technological development for sustainability is acknowledged, there is a global trend towards increased regulation of new technologies, be it for concerns about their safety or ethical and societal concerns. The conception and development of policies governing technology needs strong scientific support.

Research questions:

Land management en Impacts of land management

The development and use of high tech monitoring and data collection in relation to soil and land use: e.g. real time monitoring using satellites, precision farming, remote sensing and (geo-tele)detection, use of drones, …=> what are its possibilities, what are priorities, what are unintended effects?

BE-26: Holistic approach

Complex societal challenges, like (research on) land use and soil management, should be approached in an integrated and holistic view in which the interactive nature and interdependence of external and internal factors is stressed. In an integrated approach complex systems are viewed as a whole, with its own dynamics, and the individual components should “collaborate” to fulfill the main objective. This results in an integration of many different disparing functions and different disciplinary fields for a collective optimum performance at minimum cost to the objective in a sustainable manner and also result in long term benefit to the environment. Strong emergence of collective behavior of complex system should be the cornerstone of an integrated approach.

E.g. There is a strong need to engage the whole product/process chain and sector, using a complete life cycle oriented approach: “Life Cycle Thinking”.

Research questions:

*Process related item and **relevant to all four integrative themes.***

How to promote an integrated approach and system thinking (e.g. life cycle thinking)?

How to set up an holistic and systemic approach in soil and land use (research), taking into account indirect and unexpected events? How to find the equilibrium between the 2 extremities: fragmentation of knowledge and the postmodern “talking about the whole without acting”?

How can system dynamical modeling help to understand the complexity so that new needed knowledge and/or measures can be developed (e.g. try to connect the C-N-P-cycles in one holistic model)?

How to take into account the different scales (in time and space) in soil and land use (e.g. parcel, region, landscape, country, …), needing all a different framework, within the holistic and integrated approach?

BE-27: Integrated risk/impact assessment on industrial sites (and for other activities/practices)

Industrial activities (and other land management practices) could have impact on different environmental compartments (e.g. air, water, soil, sediments, …). Policymakers need to use a more integrated risk evaluation for all impacted compartments, ensuring that the suggested measures to reduce the environmental impact are not conflictual, e.g. excavation of contaminated soil gives birth to landfills. These landfill sites cannot be used for other developments. It is imperative to keep track of the whole and to understand the mutual impact of decisions made. Priorities need to be set and supporting actions taken. This can be a win-win for the industry and society.

Research questions:

Impacts of land management

How can we make such integrated assessments? What kind of research is needed to provide knowledge to make optimal choices?

How can we integrate soil and land use aspects in the existing environmental impact assessment?

BE-28: Ecosystem approach

Ecosystem services can contribute to economic development and research on the ecosystem approach can help to grow awareness. Economic models should take more into account certain ecosystem related parameters like e.g. soil fertility or the pollination of crops.

Research questions:

Overlap of all four integrative themes

What kind of research is needed on the interface between biodiversity, ecosystem services, nature on the one hand and economic development on the other hand?

Impacts of land management

How to map the “trade off” between money or economic growth and ecosystem in a better way?

BE-29: Mind shift and change in behavior

Having the "right" knowledge and practices is not enough to challenge the needed change. A mind shift and change in behavior -at the level of all stakeholders- are required.

Social sciences should unveil the triggers needed to provoke change. This, however, demands technical knowledge of the soil and land use system in the bigger framework to be fully comprehensible. You must know the process in order to know how things must be changed. The relevant information/knowledge should be disseminated to the stakeholders in order that they know why a change in mind and behavior is appropriate or needed. The added value of change for all stakeholders and society needs to be clarified and clearly and visually communicated.

The importance of pioneers (actors who seek to own initiative for alternatives) is very clear and should not be ignored here. Based on their own new ideas or vision, they take new (in the beginning) individual initiatives and could be new "leaders" who can share their ideas to colleagues.

Research questions:

Process related item and ***relevant to all four integrative themes.***

How can we encourage the citizens/farmers/politicians/… to change/adjust his/their mindset and behavior so that something can change? For example: how to change the conventional agricultural methods into alternative methods (e.g. no tillage) ? E.g. by helping to change farmers' perception on soil => soil is a partner that the farmer should treat as such.

How to support pioneers in transition behavior or mind shift?

Applied Agent Based Modeling: how can farmers make the right choices? Therefore they need the right information. How to model the farmers' behavior in relation to different constraints (e.g. market prices, …) and the different related scenarios and costs?

3.3.3 Prioritization of research topics

After the discussion in workshop 2 on the research topics and the research needs, each workshop participant had 5 votes to give to the research topics which need to most research efforts (and budget) at this moment and in the future, to tackle the societal challenges. The list of the topics is the same list as described in this report.

The results of the voting (reported from high to low scores) are summarized in the table below.

	RESEARCH TOPICS	score
1	LONG TERM MONITORING SSW-SYSTEM (INCLUDING FRAMEWORK!	10
22	CONFLICTS ON LAND USE	10
27	INTEGRATED IMPACT ASSESSMENT SOIL AND LAND USE	10
6	INTEGRATED APPROACH REMEDIATION - LAND USE/SPATIAL PLANNING	9
7	INTEGRATED APPROACH SPATIAL PLANNING, SOIL AND SUBSURFACE	8
26	HOLISTIC APPROACH	8
29	MIND SHIFT AND CHANGE IN BEHAVIOR	8
16	SOIL ECOSYSTEM SERVICES	6
21	PRESSURE ON LAND, FRAGMENTATION, SCARCITY OF LAND	6
2	SURVEY AND RISK EVALUATION CONTAMINATED SOIL, GROUNDWATER, SEDIMENT	4
5	REMEDIATION TECHNOLOGY CONTAMINATED SOIL, GROUNDWATER, SEDIMENT	4
23	AGRICULTURAL PRACTICES AND LAND MANAGEMENT	4
8	INNOVATIVE FUNDING SYSTEMS FOR REMEDIATION / BROWNFIELD DEVELOPMENT	3
10	ORGANIC CARBON IN SOIL	3
18	SOIL BIOLOGY AND SOIL BIODIVERSITY	3
24	SPATIAL PLANNING	3
extra	METHODS TO APPLY EXISTING KNOWLEDGE	3
4	NEW OR EMERGING CONTAMINANTS IN SOIL, GROUNDWATER, SEDIMENT	2
28	ECOSYSTEM APPROACH	2
3	DIFFUSE CONTAMINATION	1
9	EXCAVATED SOIL/SEDIMENT	1
13	SOIL SEALING (COVERING)	1
17	RECYCLING OF SOIL NUTRIENTS (e.g. P, N)	1
19	REMEDIATION "AGRICULTURAL" CONTAMINATION (P, N, pesticides)	1
20	INTEGRATED PEST MANAGEMENT - USE PESITICDES, HERBICIDES, ..	1
25	HIGH TECH MONITORING AND DATA COLLECTION	1
11	CONSERVATION SOIL FERTILITY	0
12	EROSION	0
14	SOIL COMPACTION	0
15	WATER RETENTION CAPACITY OF SOIL	0

What strikes is the high scores for the **more horizontal oriented, trans disciplinary, system focused** and **integrating** themes; and the **process related** topics to the prejudice of the more "specialized" fragmented topics.

In the discussion after the voting, workshop participants stressed that these "fragmented" topics were not considered as "less important", but that the perception lives that these topics are already on the research agenda. Whereas it was felt that the **more horizontal oriented, integrated and process related topics** really need a focus on the research agenda, because **knowledge, implementation and funding on this topics is lacking**. These topics integrate all the fragmented specialized knowledge (which is also needed!) and try to connect and translate these knowledge into applicable knowledge.

3.3.4 Existing knowledge agendas

Not all interviewees made use of an **existing knowledge agenda**.

Some of the interviewees mentioned existing research agendas: e.g.

- Each Flemish administration has its own (limited) research agenda
- Witboek voor Landbouwonderzoek
- Onderzoeksagenda Ruimte Vlaanderen
- TWOL
- IWT (little attention for soil and land use)
- FWO (only linked with people, not topics)
- Innoviris (Brussels)
- Danish Soil Partnership (see Annex VI)

3.4 Experiences regarding connecting science to policy/practice

The following information and opinions were given by the interviewees answering the INSPIRATION questionnaire.

3.4.1 Use of knowledge

Scientific knowledge can be defined in various ways and can have various shapes (e.g. fundamental, applied, practical, … scientific knowledge). An unequivocal answer to this question is not present. One example of a given answer by a stakeholder: “Scientific knowledge is information about the nature of a cause-effect, delivered with a high degree of certainty.”

Most knowledge end users **need to use up-to-date scientific knowledge in their jobs**, e.g. for solving practical or policy problems (e.g. monitoring, impact assessments, modeling, …) in an appropriate way (with more certainty (e.g. about the impact of measures), more efficiency, more effectiveness, more sustainability, more cost efficiency, …).

Dissemination and exchange of scientific knowledge happens mostly through the **classic pathways**: internet, papers and reports, Google Scholar, networks via projects, informal and personal contacts, conferences, newsletters, … . Policymakers have often more knowledge exchange with **consultants** than with universities or research institutes.

The “soil knowledge world” (experts, policymakers, different stakeholders) is a **small world** and knowledge is exchanged in an easy, mostly informal, way.

One of the met difficulties using and disseminating “scientific knowledge” is that scientists produce “**black-white, objective” knowledge**, whereas policymakers need also to consider the “**grey, mixed, subjective” opinion** of different stakeholders.

“Commercially or privately” collected data on soil quality and on soil contamination are often private and most of the time not available. However they could provide good and useful information.

The interviewees indicated that is not in detail known to what extend has been made use of the **state-of-the-art in scientific research for the formulation of existing policies**. In general existing scientific information (provided by scientists) is/was used as a basis for policy decision, however, (now more and more) civilians (society) and/or other stakeholders (like lobby groups) also want to participate in policymaking and give their “non-scientific” input. This is a difficult equilibrium to manage. Policymakers should take their role in this process and steer/advise.

3.4.2 Possibilities to set the agenda

Possibilities to influence national or regional research agendas are for most knowledge end users **very limited**. Most priorities are determinated at a (higher) political level or at academic level. Regional public administrations include innovation or new research in their own (limited) research agenda.

At **academic** level there is a high degree of academic freedom: scientific researchers develop their own research agendas. Universities can also provide research or consultancy on demand (e.g. for policymakers, industry, …). **Structural consultation** (e.g. in periodic workshops, conferences, networks, platforms,…) about research needs with policymakers or industry or between universities is not a common practice, but could be very useful and fruitful. End users learn to know which scientist could help them and scientists learn about the end users research needs.

Policymakers and scientists should be keeping and watching their **independence** regarding the development of research agendas. But on the other hand they also should "**synchronize**" on needed "new" research, respecting their mutual objectives.

Policymaking used to be funded on knowledge provided by scientists, whereas now, citizens or other stakeholders also want to participate in policymaking and give their "non-scientific" input. This is a difficult equilibrium to manage. Policymakers should take their role in this process and steer/advise.

Policymakers should be more involved in setting the research agendas from e.g. IWT (Agentschap voor Innovatie door Wetenschap en Technologie: *Government agency for Innovation by Science and Technology*), FWO (Fonds Wetenschappelijk Onderzoek: *The Research Foundation*), … .

3.4.3 Science – policy – practice

Most knowledge end users indicate that they are sometimes **involved in the formulation of scientific research questions, scientific research or the synthesizing of scientific knowledge** in function of their jobs. The translation of research needs into scientific research questions is not always easy because the knowledge end users aren't scientific institutes. Sometimes they need external partners to help them with the translation. **Good communication** between the knowledge end users and scientists is essential to define proper research questions and obtain proper research results, but this process takes often a lot of time. When the research questions are very applied, targeted and/or practical, it is easier to translate the research questions.

How to **improve to science-policy-practice**? Some **suggestions** or **questions** to answer, formulated by the interviewees:

- Scientists want to deepen research topics and develop "new" knowledge ⇔ knowledge users (e.g. policymakers, industry, farmers) want to broaden and link topics and want more practical and robust knowledge to solve their problems. Policymakers should try to **connect** both parties to ensure more policy relevant research. Providing relevant knowledge for immediate application gives scientists opportunities to use/produce knowledge in a creative and innovative way.

- Also the dissemination of not successful research results could be helpful and can be very valuable as "**lessons learned**"
- **Stakeholder coaching** (not only involve sociological experts who are again academic experts, but really the coaching of the process) during the process of knowledge development could foster the formulation of more "demand driven" research needs and the implementation of the developed knowledge.
- Working **transnational** could offer scale opportunities, e.g. developing new technology that could be used in different countries whereas on the national level the field is too small to define a well-functioning market.
- There is need for a **common European vision** on soil and a framework to provide focus on common goals and targets. This will foster the collaboration in research related to soil and land use.
- The collaboration between scientists (working often on more fundamental research) and consultants (applying the knowledge) is not always easy. Policymakers could help to find a **mutual understanding and foster collaboration**. This process takes time.
- **Structural consultation** (e.g. in the form of a platform or network, periodic meetings, a framework contract with research institutes, …) between knowledge end users and the different research institutes is very useful and can offer an added value because of the broad and transdisciplinair discussions, but is not easy e.g. taking into account intellectual rights. Collaboration in an informal or bilateral way is sometimes more easy.
- In **European projects** a large body of **knowledge and tools** are developed, but **not (optimally) used**. The projects should be **demand driven** according to the need of the end users so that developed knowledge and tools are effectively used.
- Disseminating high quality scientific information via "**open source**" is important.
- Stimulating innovation by **adapting rules for procurement** (e.g. more attention for sustainability and long term effects as selection criteria in proposals) is necessary to give a boost to the development and implementation of innovative solutions. Considering a broader range of issues when choosing contract award criteria should include setting standards for documentation, assessment and methodology
- A lot of knowledge is available but is **locked and not distributed to the end users** (cfr. The EPA[8]-website gives good scientific and policy information). **Key-people** can help with the distribution of knowledge: who is who within Europe in the different research domains? An **inventory of knowledge and public/shared databases** (e.g. on toxicological parameters, monitoring data, …) could also be very useful. **Existing research results** should be used in further research and knowledge developments.

[8] EPA: US Environmental Protection Agency

- Fundamental knowledge should be **translated** into applied practical knowledge resulting in suitable tools and concrete measures, tailor-made for the relevant end users (e.g. for municipalities, …).
- **Raising awareness** and **tailor-made communication** (resulting in a mind shift and change in behavior) is as/more important than developing extra "new" knowledge. This will result in the effective implementation of the "appropriate" knowledge by the relevant stakeholders.
- How to take into account all aspects of soil and land use on a **systemic level** (can we see the **whole picture**)?
- How to find an **equilibrium** between academic freedom and independence and the synchronizing of developing "societal relevant" knowledge?
- Make challenges and topics as concrete and "**recognizable**" as possible and explain the **"why**" of the needed research and its implementation. Make it **visual, inspiring and attractive.**
- **Scale** (in time and space) is very determinative to take measures: need for knowledge that is adaptable to the scales on which it will be deployed, data, measures (e.g. parcel, community, city, region, country)
- **Trans-disciplinarity** is important: e.g. involving social sciences who can e.g. link scientific land use information with sociocultural aspects

In most cases the **impact** of research is not explicitly monitored/checked, but is guaranteed as much as possible through the involvement and consultation of all the stakeholders before, during and after the process and by checking the quality of the work done. The quality of IWT (a Flemish funder) funded research, e.g. the impact of the research on society (who is reached, long term effects, …), is monitored using indicators.

No national SPI documents are mentioned.

Some mentioned SPI initiatives in different sectors are added in Annex III.

3.4.4 Science – policy – practice: workshop positions and discussion

During the workshop several positions were used to start a discussion about the actual and future SPI process in Belgium, Luxembourg and Denmark.

Both knowledge producers and knowledge users discussed, in a critical fashion, the role of scientific research and the interface between science and policy. Inspiring cases were shared and possibilities for trans-disciplinary and cross-boundary collaboration (and funding: see next chapter) were explored.

Position 1: During the interviews, stakeholders stressed that a lot of knowledge is available.
How can we inventory, translate, disseminate and tailor-made communicate this knowledge to the relevant end users?

Actual SPI process	What goes well? (Success stories, good practices) What goes wrong? (Lessons learned)
Future SPI process	How to improve? Which actions should be set up? For each scale separately or jointly? For each sector separately or jointly? Who has to execute these actions? Where to start? What are priorities? Time schedules?

Position 2: To tackle societal challenges, new knowledge and research is needed to fill existing knowledge gaps.
How could the end users let know their needs to the knowledge developers?

Actual SPI process	What goes well? (Success stories, good practices) What goes wrong? (Lessons learned)
Future SPI process	How to improve? Which actions should be set up? For each scale separately or jointly? For each sector separately or jointly? Who has to execute these actions? Where to start? What are priorities? Time schedules?

Topics in the discussion:

A lot (enough?) scientific data and knowledge are available => There is a need to **talk and share** them:

- Need for exchange of data and knowledge using interactive **platforms** (e.g. INSPIRE, ANAE, EUGRIS-portal, IAP, …): scientists and other stakeholders can communicate and share their data, in exchange for **acknowledgment** for their work
- What about the **quality** of existing knowledge and data? How to guarantee them?

- How to tackle “academic competition” issues in order to promote “open source knowledge and data sharing” and shift to “academic sharing”? (*Remark NFP: This is not only an issue on academic level, but on every level?*)

Need for **more coordination** on:

- Research topics: the same topics are treated in different research institutes, regions, countries (risk for overlap): scientists need to talk more to each other, using the same language
- Data gathering and exchange is sometimes difficult because of different collection methodologies

Need for highly ranked **journals for holistic studies** (integrated projects, system thinking, multi-actor-projects, co-creation, …) to publish articles and studies on these topics and to disseminate experiences, lessons learned (also mistakes,…) and knowledge on integrated approaches. Need for the **funding** of these journals.

Need for **knowledge brokers** and need for **funding** for the translation by knowledge brokers. Knowledge brokers should coordinate and facilitate the translation from existing “fundamental” knowledge/science into applicable knowledge/science/tools/policy and disseminate the applied knowledge/science/tools/policy to all relevant stakeholders. The knowledge brokers can also coordinate and facilitate the translation of specific end user questions into research questions or assignments (cfr. German specialized companies). The role of knowledge broker could be taken up by institutions like e.g. INBO, ILVO, CRA, OVAM, … . Funding for knowledge brokers could be collected based on certification or labeling: e.g. for products fabricated on soil that is sustainably managed.

Innovation is not only developing “new” knowledge, but also making **“new links”** between existing knowledge topics.

Need for sustainable and long term thematic joined stakeholder **networks** (e.g. soil platform in Luxembourg) and **co-creation** (i.e. “real” collaboration between knowledge developers and knowledge users from the beginning and not only dissemination to the end users at the end) to tackle societal challenges using scientific knowledge.

Engage the **whole product/process chain and sector**, using a complete **life cycle oriented approach**: **Life Cycle Thinking** can help identify opportunities and lead to decisions that help improve environmental and social performance and image associated with supply chains, end-of-life waste management, as well as when using products, helping to reduce associated risks and improve economic benefits (see for more information: http://eplca.jrc.ec.europa.eu/). Monitoring the sustainability performance of life cycle activities related to soil and land management can support the development of effective **policy assessment and implementation**. (According to the latest recommendations from the European Platform on Life Cycle Assessment for those working in the field of policy development, Life Cycle Thinking and Assessment are beneficial for a number of reasons:

- Gathering baseline information on social, environmental, and economic considerations for market-orientated policies and the promotion of innovative product design
- Accounting for trade-offs between options

- Understanding trends in product supply chains and where it may be best to influence the chain
- Developing resource strategies, such as optimal waste management
- Better informing consumers through the use of labelling schemes and the use of Green Public Procurement (GPP).)

"Science needs **freedom**": The gap between end users and fundamental research is not necessarily negative: end users tend to think short term and when they influence fundamental research institutions too much, these last ones could be dragged away from their core activities (namely fundamental research, long term)

Need for **"senior" (permanent) scientists at academic level**: scientists with long term experience are necessary to **integrate** all scientific expertise and see the whole process and system; and to **stabilize** the existing knowledge

Sometimes scientific knowledge is **neglected or not taken up by policy makers** (e.g. climate debate, agricultural research project on functional agro-biodiversity)

Not only science is fragmented, also **policy making can be fragmented** and decisions made in one department can be contra-productive for another department

The role of **civil society** is getting more important (e.g Ringland in Antwerp): citizens and citizen movements are becoming a more important partner in collaboration. They push and ask questions (multi-polarity). Citizens and scientists could work together as activists. However this is not always easy.

Promote **long term funding** instead of short term applications. This is very important to protect (and restore) the environment on the long term.

Social and anthropological research (and the translation of this knowledge into tailor-made communication) is needed to foster change in human behavior. E.g. the **link between consumers and producers** needs to be restored if we want that consumers understand that a farmer needs a good price for his products in order to produce healthy food in a sustainable way (i.e. with attention to sustainable soil and land use). Consumers and producers also need information and awareness on the **impact on society and the costs to society** if e.g. product prices are too low.

Need for **impact analysis** of the different **policies and legislations** related to soil and land use: e.g. search for conflicting laws, conflicting subsidies, …

Need for **long term integrated research programs, focusing on different targets and different gaps**. Need for "new" type of consortium or partner collaboration: **spider web construction**: small core group (2 or 3 partners) which focuses on the targeted questions and deepens the subjects. They ask for cooperation on a wider group of "specialized" partners who make the translation of the topics into specific applications. Implementation of the new knowledge in pilots or demonstration projects is an important part of the global integrated research framework. Dissemination and ask actively for feedback from end users is also important, as well as monitoring the long term impact and evaluation/adaptation based on the monitoring results.

Need for long term and small scale experiments

Stimulating research on **integrated approach** is also difficult and fragmented on **policy level**, e.g. different ministers and administrations are responsible for different topics which should be treated in an integrated way. The government should act as a whole. Working together between or within administrations could be difficult because of the fear that jobs or budgets will be lost. It is important to clearly show the added value of cooperation.

Need for **"true" partnerships** between policymakers-scientists-private companies for research

Need for **"flexible" partnerships and approaches** for research (e.g. in IT-sector: intermittent develop – evaluate – develop – evaluate - …): this approach needs a specific kind of contracts

Not only the agricultural sector or industrial sector are important knowledge end users, also **citizens** (e.g. use of pesticides, promotion of ecological gardening, promotion of green): how to reach and convince them?

Holistic and integrated thinking and problem solving should be part of the **education** and taught to students

Different **stakeholders** are **influencing** the research agenda for "new" knowledge: what is their role and interaction: e.g.

- Scientists: try to convince policy makers of the importance of a topic
- The European Commission influences decision-making in a strong way
- Industrial enterprises that developed technology are lobbying for return on investment (e.g. on satellites)

One of the problems with translating end user needs into research questions is that **end users** (e.g. farmers) tend to have **little interest in participating in the preliminary phases** of research projects (definition of the research questions). Communicating with sector representatives is a possible solution, but doesn't necessarily mean the gathered information reflects the real end user (e.g. the farmer on the field) needs. How should they be convinced to participate?

Privately ordered knowledge development (e.g. by industrial stakeholders) often stays locked and is not shared, although the knowledge could also be interesting for other stakeholders

How to foster or **reward policy relevant research** at academic level? Now there is a focus on rewards by publication. How can we change that?

3.5 National and transnational funding schemes

3.5.1 Funding schemes and possibilities for research funding

The following information and opinions were given by the interviewees answering the INSPIRATION questionnaire.

Regional, national, European and international funding schemes

Belgium is a complex federal state where the communities and regions are responsible for scientific research, although the federal government still has some smaller competencies on this matter as well. This leads to fragmentation of the budget. Most of the research funding comes from the regional and European level. A comprehensive listing of identified regional, national, European and international funding schemes is added in Appendix IV.

Policy research directly commissioned by regional authorities, is usually funded with their own financial resources. Regional government institutions are fully or partially financed by a grant from the regional government. Some interviewees indicated that the funding of policy research should be supervised or distributed by a single public body as much as possible. Obviously, this currently is not the case yet and leads to fragmentation because different institutions prefer to manage their own research budget. The Agency for Innovation by Science and Technology (IWT) or the Department of Economy, Science and Innovation (EWI) could take up such a central role in Flanders, and manage and distribute all regional funds for policy research.

Knowledge institutions have the impression that research on the environment in general, and soil or land use in particular is not high on the priority list of the IWT. Proposals submitted to the IWT are always formulated by scientists or research institutions, and are therefore largely influenced by the self-interest of the scientist. Integrating the needs of end users, industry or government could make the funded research more relevant, concrete and applied. Consultation of stakeholders prior to formulating research needs can allow for a more objective and independent formulation of the research questions.

Participating in and applying for European projects is very suitable to build an international network and to develop and exchange knowledge. On the other hand, the complex procedures and low success rates often discourage organisations to participate and submit a proposal. The whole of European funding opportunities is a complicated maze that urgently needs to become more accessible and transparent. In European funding programs and more specifically in Horizon 2020, little attention is paid to soil and land use related research. Moreover, Horizon 2020 is susceptible for lobbying by the scientific community, which leads to wrong priority setting. There is a lot of attention for temporary fashion trends that are of little scientific relevance.

More (financial) cooperation is necessary

Between public and private sector

Some public authorities or research institutions sign cooperation agreements with other national or international partners in order to share the cost of joint research efforts, or even carry out consultancy assignments for other authorities or companies and to generate additional funding on top of their grants.

There is general consensus that more financial cooperation between public authorities and private partners (PPP) can significantly increase the added value of research on soil and land use. Because of public budget cuts, less money is available for research funding. PPP will thus become increasingly important as an alternative. Moreover, the involvement of private partners could provide the guarantee that the research results will be relevant and effectively applied. Private partners pursue return on investment and can be a driving force. Other new financing models like crowdfunding will gain in importance in the future.

By using innovative procurement methods (e.g. pre-commercial procurement) the public sector can develop innovative solutions to respond to societal challenges together with private partners. This improves the international competitiveness of enterprises and increases the engagement of the private sector in the research. Early involvement of businesses and stakeholders will also increase the impact and relevance of the research. However, strict legislation on public procurement can sometimes impede the establishment of privileged partnerships between public organisations and research institutions, because the entire market must be consulted first.

Initiating and funding research is not an exclusive responsibility of the public sector. The industry should fulfil its duty of care under all circumstances and proactively initiate research to guarantee that their products and services are not harmful to human health.

A more extensive collaboration between public and private sector should be fostered and stimulated by the European funding programs. This could be explicitly mentioned in the call for projects.

Between public organisations

Belgium needs more horizontal cooperation and coordination between the various governments that fund environmental research. Because of the unique federal state structure there are a lot of governments and public agencies in Belgium, which leads to fragmentation of research. Conflicting interests or hidden political agendas often hamper cooperation between these public bodies. The creation of a new central coordinating body or the centralization of research funds with an existing organization could reduce fragmentation and avoid duplication of research. It would also increase the quality of the research and guarantee consistency with a vision in the long term. Specifically for research on soil and land use, a new expert counsel at national level in analogy to the Technical Committee on Soil Protection in the Netherlands, might prove beneficial.

The establishment of networks for knowledge exchange between policy makers like the Common Forum on Contaminated Land in Europe can also contribute to more intensive transnational collaboration between government institutions.

Between knowledge providers

Belgian research institutions often have similar specializations but different priorities. Cooperation between universities or between different scientific disciplines can be improved. There is still rivalry between research institutions or departments. Maybe an additional structure that operates on a supra level is needed to coordinate all interdisciplinary efforts. Finding a common language and a way of communicating between scientists is key in this process. Physical meetings, discussion and network events could also help.

Most knowledge institutions are fully or partly financed by government grants. Public authorities should use their influence to organize the research at the universities more efficiently. Certain disciplines, specializations or departments of various universities could cooperate more and some research topics could be merged so that the research institutions evolve more towards the (extreme) model of the university of Wageningen where almost all agricultural research in the Netherlands is concentrated in one university.

Both at national and international level, repetition or duplication of research is a major issue. To avoid this, scientists should be required to first inventory and evaluate existing knowledge, before starting on new research. Accessibility and dissemination of research results and scientific reports is key.

3.5.2 Gaps in financial resources for research

Because of its scale and the large budgets available for research, Europe should make additional efforts to promote large-scale, cross-border, integrated projects on the long run. E.g., setting up a very costly large-scale harmonized European monitoring network for certain soil parameters is currently not possible because there is no budget available. The collection of data for soil-related research purposes, is very time consuming because there is no harmonized European data set with soil parameters available. A European soil database fed by measurements of different member states should be the ultimate goal. In addition to public authorities and knowledge institutions, certain private companies might also dispose of valuable data, but they often ask financial compensation for the use of it. Besides supporting the establishment of a European soil database, the European Union should also promote and coordinate the harmonization of the different standard and detection methods and risk assessments for soil contamination.

In Belgium and by extension in Europe, there is a lack of thorough interdisciplinary and holistic research. Researchers often operate in the narrow confines of their own specialisms. Scientific articles with a more holistic approach, often don't get published in peer-reviewed journals. That is why there is little scientific substantiation for a more holistic or integrated approach. In Belgium there is no university that has a discipline or department on system thinking. The University of Antwerp does offer a course on 'methods and techniques for interdisciplinary research'.

It is important that researchers take economic, social, legal and psychological aspects into account. Open communication with stakeholders and proper disclosure of the results and underlying data sets is absolutely necessary. Regional as well as national or European authorities need to stimulate holistic, trans-disciplinary, integrated approaches.

Society and politicians still don't fully recognize the importance of a healthy soil and sensible, thoughtful land use. Continuous communication and raising awareness could reverse this attitude and give a boost to the research on this subject.

In addition to a mind shift, a European Soil Framework Directive with (binding) quantitative targets (possible for other environmental compartments such as water and air, so why not for soil) will give a boost to research on soil and land use. In that case, the Joint Research Centre of the European Commission in cooperation with the EEA should first study the consequences of the legally binding document and then deduce the most urgent research needs from it (knowledge needed to achieve the targets) so that those needs can be integrated into the calls of the European funding programs.

3.5.3 Funding and (financial) collaboration: workshop positions and discussion

During the workshop several positions were used to start a discussion about the actual and future funding and (financial) collaboration.

Inspiring cases were shared and possibilities for trans-disciplinary and cross-boundary collaboration and funding were explored.

Position 1: The budget for research related to soil and land use in Belgium is fragmented.
How can funding be more efficiently used to create added value (leverage) in new research on soil and land use?
Existing funds

Actual funding	What goes well? (Success stories, good practices) What goes wrong? (Lessons learned)
Future funding	How to improve? Which actions should be set up? For each scale separately or jointly? For each sector separately or jointly? Who has to execute these actions? Where to start? What are priorities? Time schedules?

Position 2: The budget for research related to soil and land use is getting smaller (all over Europe)
How can (alternative) funding or smart cooperation (e.g. integrated approach) tackle the smaller budgets?
Alternative funding (e.g. co-design and co-funding,; green deal, PPS, Framework partnership agreement, Innovation fund of European investment bank ,
natural capital financing capacity, crowdfunding
Smart cooperation: inter-, intra-, transdisciplinair? Transsectoral? Transnational?

Actual alternatives or cooperation	What goes well? (Success stories, good practices) What goes wrong? (Lessons learned)
Future alternatives or cooperation	How to improve? Which actions should be set up? For each scale separately or jointly? For each sector separately or jointly? Who has to execute these actions? Where to start? What are priorities? Time schedules?

Topics in the discussion:

The budget for research related to soil and land use is definitely fragmented in **Belgium**:

- 3 different languages
- 3 different regions
- Funding on different levels (federal, regional and sub-regional)
- Lack of communication on funding and on research-themes worked on
- Every regional level has a multitude of (research providing) parties and end-users involved without structural communication between parties

Situation for **Denmark**:

- Not as fragmented as in Belgium
- Thematically subdivided
    - Land use
    - Soil contamination and remediation
    - Agriculture
- Integration is not always possible/desirable; soil is a “common denominator” between several themes and not everything can be integrated in the same research package

Situation for **Luxembourg**

- Little fragmentation as Luxembourg is a small country, but
    - some fragmentation due to different research themes being stressed
    - communication/exchange between themes can be improved
- Major funding source: Fonds Nationale de la Recherche (FNR)
    - Goal: stimulating “excelling research”
    - Basically for fundamental research
    - Different topics / macro-areas covered:
        - Societal challenges
        - IT-challenges
        - Natural resources management
        - Urban area management
- Funding for applied research mostly by
    - Public authorities
    - Private companies

Belgium, Denmark, Luxembourg,… all are rather small countries and –consequently- have smaller research budgets available.

Collaboration between (smaller) countries could be a solution for this problem. There are already some partnerships between funding agencies on European level (e.g. "ERA") so smaller countries can benefit from the scale-up. To make collaboration on a (sub-)European scale possible, there is need to identify common research needs/research agendas.

Collaboration is often being retained by **cultural determinations**: every country (region) wants to "re-invent" its own regulation, wants to work with own partners,… and as long as a **common (European) regulation/legislation** remains absent, this problem will subsist.

Products/solutions developed by a "consortium" of parties (to serve the needs of all of these parties) can benefit from both the economy of scale and the fact they're "custom-made".

Collaboration is not always possible as mostly countries can't start from scratch, there is always one or another method or approach that has already been installed. This existing situation has to be taken into account.

Fragmentation of funding can also be positive as some problems ask for a very local or even site-specific (tailor-made) approach and/or solution.

Thematic fragmentation is also problem that cannot be denied on the Belgian level. Soil is being approached from different points of view (forest soils, natural soils, agricultural soils, contaminated soils) without there being a "general approach". Every thematic group is looking for funding for its own theme but should work together with the other groups to create a "common level" and find funding for this "common level". The current situation is that there is collaboration but on a thematical (cross-regional) basis. A different approach (= redefining of the themes starting from a common basis) could benefit collaboration and knowledge exchange between different stakeholders.

A (European) legislation could be the answer to this problem. From the moment on things are being regulated by legislation, funding will follow as the member states will have to follow the European Directives.

Political concerns have to be taken into account too. The legislative level wants to know what the cost of a certain legislation will be before implementing it.

Remark**:** bringing all funding into one general funding mechanism isn't always beneficial (e.g. The Netherlands where they experience significant problems after centralizing all soil related funding).

Soil is not a sexy topic. It is difficult to have soil and land use related research financed: the importance of soil and land use should be made clear to politicians and land owners.

It is also difficult to have co-creation projects financed, because they take more time.

"Science will not change itself, but finders will"

"How to change the funders?"

Direct research funding by policy makers is becoming more important than funding by scientific funding channels. This leads to fragmented budgets.

The ESPON 2020 Cooperation Programme is an example where funds are brought together.

VITO has developed a model on land use funded by different public administrations. Coordination. The integration and coordination of such projects should be done by the government and not by the research institute.

A soil protection law could force interaction on research, e.g. by member states or citizens.

Crowdfunding has a strong symbolic value: everyone who contributes has an interest.

There are **European funding frameworks** (e.g. LIFE) that can be very useful for smaller countries and very specific problems, but have the disadvantage that funding is limited to a smaller part of the total cost (50-60%). Other frameworks fund a higher percentage of the total cost (up to 100%) but have a higher level of competition.

The general feeling is that European budgets are not getting smaller, but that there is a lower success-rate of the proposals, and as time spent to apply to a call is higher, there's a lower return on investment (what makes parties decide not to apply for certain funding systems).

There is also the idea that global research budgets aren't declining, but there is a certain "**budget shift**" noticeable towards the "fashionable" themes Europe is putting more stress on (e.g. remote sensing, biodiversity).

Three **major problems** related to European funding frameworks are listed:

- competition is getting harder
- administrative burden for European projects is getting more and more demanding
- co-funding is not always possible as potential partners cannot always provide 50% of the funding. Plus: private companies don't tend to be interested to co-fund as the profit-margins in the sector are to low

The co-funding problem can be tackled at national level: when the project is accepted, the country provides the other part of the funding.

Evaluators of European projects have a crucial responsibility and are now mostly scientists. Why not involve citizens, pressure groups, policymakers, … ?

It also stands to reason to show and measure the impact of the proposed research. This is however not always easy to measure.

It is **difficult to find co-funding** for research projects **for (small) civil organizations** (e.g. small NGO, non-profit organization, …)**, and for society as end user, in general**. Integrated LIFE-projects give sometimes opportunities (e.g. cooperation between public administration and NGO).

Municipalities are willing to co-fund for soil and land use related projects, e.g. on erosion projects

In the past, most European Directives were implemented to solve an existing problem and research was funded to find a solution for that problem. When **anticipating** to possible future problems, research budgets could be used more efficient.

3.6 Other remarks made by interviewees

Looking for “new” needed knowledge and relevant research questions is one thing, but a lot of **good knowledge already** exists and is not effectively used: to improve the use of existing knowledge is also very important, perhaps more important.

Very important **boundary conditions** to support/ensure the development and implementation of the research agenda are:

- A good **juridical framework** for all relevant topics is necessary to offer “legal certainty” for all stakeholders.
- **Political climate and stability**
- **Market** regulation

Mind shift and change in behavior are the key drivers for change. Importance of **raising awareness** to, **co-creation** with and tailor-made **communication** to all related stakeholders.

3.7 Annexes

Annex Ia: NKS interviews in Belgium

	Stakeholder organisation			Profile INSPIRATION													
	Name of the entity	Country	Contact person	funder	end user	knowledge provider	national-regional-	university/research	SME/consultant	business and industry	NGO	network	other	soil	sediment	water	land use-management
13/08/2015	Société publique d'aide à la qualité de l'environnement (SPAQuE)	Wa	Marie Jailler Pierre Dengis Claudia Neculau	1		1		1						1		1	
29/06/2015	Katholieke Universiteit Leuven	Vl	Erik Smolders			1		1						1	1	1	1
7/07/2015	Vlaamse Instelling voor Technologisch onderzoek (VITO)	Vl	Guy Engelen			1		1	1					1	1	1	1
15/07/2015	Service Public de Wallonie (SPW)	Wa	Ester Goidts	1	1		1							1	1	1	1
9/07/2015	Leefmilieu Brussel	Br	Saïd El Fadili	1	1		1							1	1	1	1
1/09/2015	Vlaamse LandMaatschappij (VLM)	Vl	Carole Ampe	1	1		1										1
3/07/2015	Departement Leefmilieu, Natuur en Energie - Afdeling Land en Bodembescherming, Ondergrond, Natuurlijke Rijkdommen	Vl	Joost Salomez	1	1		1							1		1	1
2/07/2015	Departement Landbouw en visserij	Vl	Ellen Maertens	1	1		1										1
15/06/2015 13/07/2015	OPENBARE VLAAMSE AFVALSTOFFENMAATSCHAPPIJ (OVAM) - Afdeling bodembeheer	Vl	Johan Ceenaeme Griet Van Gestel	1	1	1	1							1	1	1	
11/08/2015	Umicore (netwerk NICOLE)	Vl	Lucia Buvé		1					1		1		1	1	1	
5/10/2015	Ruimte Vlaanderen	Vl	Peter Willems	**1**	**1**	**1**	**1**										
10/08/2015	Ministère du Développement durable et des Infrastructures de	Lux	Sophie Capus	**1**	**1**		**1**							**1**		**1**	**1**
10/08/2015	Luxembourg Institute of Science and Technology (LIST)	Lux	Benoît Othoniel			1		1						1			1
3/09/2015	Danish regions	DK	Christian Andersen		**1**		**1**							**1**			

Annex Ib: NKS questionnaire template

See Chapter1, Annex I

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

See Chapter1, Annex II

Annex Id: Reports interviews Luxembourg and Denmark

Luxembourg

Title:	Report of the interview with Sophie Capus and Benoit Othoniel
Department / division / team:	Soil Management, Soil Investigation and Remediation West, Policy Support
Author / contact:	Bavo Peeters

1 Interview information

Date of the interview:	August 10, 2015
Country:	Luxembourg
INSPIRATION interviewer:	Nele Bal
Report:	Bavo Peeters
Interviewees:	Sophie Capus (EAL) & Benoit Othoniel (LIST)
Function:	Engineer at the Service des Sites Contaminés, Environment Agency of Luxembourg & Ph.D. student ecological economy at the Luxembourg Institute for Science and Technology (LIST)
Expertise:	Soil, water, land management & ecosystem services, life cycle assessment, economic modeling
Type & role:	The Agency doesn't fund research in a structural way, but there is a contract with the LIST for ad hoc policy support and research.

2 Societal challenges

- Due to the limited surface of Luxembourg, land resources are very scarce. Spatial planning is becoming more and more of a problem, because almost all land is already zoned and planned. This leads to increasing competition between different land uses and to trade offs with externalities, e.g. land used to cultivate bio fuels cannot serve for food production anymore.
- The list of challenges developed by the Commission is pretty complete. Loss of biodiversity is missing but is closely connected with the other societal challenges.

3 Research topics

- Most knowledge on contaminated land management is available, but not always used or implemented, so maybe a kind of **knowledge inventory** is needed.
- Should we grow **energy crops on contaminated land**? What are the positive and negative effects?
- There is still a lot of research needed on the **crossroad/interface between biodiversity, ecosystem services, nature** on the one hand **and economic development** on the other hand. The trade off between money or economic growth and ecosystem services needs to be mapped in a better way. Economic models should take more into account certain ecological parameters like e.g. soil fertility or the pollination of crops. Ecosystem services can contribute to economic development and this kind of research can help to grow awareness.
- More **monitoring and data collection on the state of natural capital** is needed, as well as the development of more efficient **monitoring techniques**. Because a lack of data, often theoretic assumptions are made without sufficient confirmation or validation.
- Luxembourg is a very small country but as member of the EU it nevertheless has to implement European legislation and directives on this limited scale. This is not always efficient. Can a **minimum scale** be determined under which decision making or implementing certain measures is inefficient?
- **Soil biodiversity and the link with entire ecosystems** needs more attention in sciences (modeling as well as monitoring), e.g. we need more knowledge about the nature and number of micro-organisms.
- How to go from an impact assessment or an **evaluation of ecosystem services to concrete measures** to promote biodiversity? How to make this knowledge tangible and applicable?
- Instead of a lot of extra knowledge, more **consciousness/awarenss and communication** is needed, and this on the different decision making levels. We need a shift in people's minds.

4 Existing research agenda

There is a Luxembourg research program on environmental issues but not on the specific topics soil or land-use.

5 Interface between science and policy

The Environment Agency needs scientific results and information in their daily practice mainly for monitoring, impact assessments or modeling. For policy makers it is not always easy to define research questions, because they know the result they want, but not the way to reach it. Therefore **good communication** between science and policy is necessary. There is a **collaboration with the LIST** so that their researchers can provide support when things get to complex or scientific. There is little cooperation between the government and the university.

Conferences and scientific papers are an important source of knowledge, but they tend to go too much in detail to be able to fulfill the needs of a policy maker.

Every department of the Environment Agency defines its research needs once in a three year time period. There is a contract with research institutions to execute this research but there often isn't enough budget available to meet all demands. INSPIRATION could be complementary to this contract.

Luxembourg is too small to capture all knowledge needs and to do research in all scientific domains. LIST's research is more applied while the university' research is rather fundamental. Except for its control by funding or grants, there is no direct steering of the government (impact on research domains rather than specific research topics).

The impact of research is not measured explicitly, but can be guaranteed as much as possible by the involvement and consultation of all the stakeholders.

The administration is currently developing new legislation to tackle contamination, which will go to parlement in October. Hopefully it will be adopted before the end of the international year of soil.

6 Financing

FNR (Fonds National de la Recherche de Luxembourg) finances Benoit's research.

Soil should get higher on the agenda and receive more attention on an international research level. INSPIRATION can contribute and promote this.

The Environment Agency does not participate a lot to European projects because the application procedures are too complex and the administration requirements are too heavy. Nevertheless European projects can establish international contacts or networks.

Some research mainly in economic sciences is financed by a PPP, e.g. research financed by banks or other financial institutions.

A large scale **monitoring of soil indicators** (e.g. to assess ecosystem functionality) or **agricultural parameters** will require considerable financial resources and a pooling of money.

Organizing collaboration between different government administrations is difficult. But also in the scientific world there should be more interdisciplinarity between the different specialisms to be able to tackle big societal challenges. There still is too much rivalry between research institutions or departments. Maybe an extra structure which operates on a supra level is needed to coordinate all interdisciplinary efforts. Finding a common language and a way of communicating between scientists is key in this process, but it takes time and this phase of the process often is seen as not productive. Maybe a European consortium could/should work on an integrated language. Physical meetings, discussion and network events could help as well. LIST is currently setting up a project with interdisciplinary research on ecosystem services assessment with researchers from all corners of science.

7 Other

- benoit.othoniel@list.lu
- Benoit's supervisor is Bendetto Rugani.

Denmark

A. Interview information
Country: Denmark Name of INSPIRATION Researcher: Christian Andersen Date of Interview: 3rd September 2015 How does the NKS wish to be referred to: Danish Soil Partnership
B. Introductions
Description INSPIRATION-project in annexe
C. Background information on the interviewee
1. Name of NKS interviewed: Christian Andersen 2. Institution: Danish Soil Partnership/ Danish Regions 3. Role: secretary of Danish Soil Partnership
4. Are you a (multiple answers possible): ○ (x) National-regional-local authority ○ University/research institute ○ Small or Medium sized Enterprise (SME, i.e. < 500 employees) / consultant ○ Business and industry ○ Non-Governmental Organisation (NGO) ○ (x) Network representative / leader ○ Other, specify: …
5. Fields of expertise (multiple answers possible): *[Ask to specify background regarding the selected item(s) in order to understand expertise background of interviewee]* ○ (x)Soil ○ (x)Water ○ Sediment ○ Urban / spatial planning ○ Landscape design ○ Land management ○ Other, specify: …..
6. Does your organisation provide external research funding? ○ Yes. To a very limited extend, usually the work we order is consulting service and we mostly offer facilitation services. The regions are themselves financing innovation as part of their investigation and remediation activities.

D. SRA

7. Which societal challenges do you regard as important?

The following is based on the challenges of the regions in relation to their legal responsibilities. It should not be taken as representative for the broader theme of soil in Denmark as a whole.

[*If needed, you can use the European Commissions (EC) list of societal challenges here. These EC themes are*:]

- Contribute to food security and food safety;
- (x)Ensure secure supplies of safe drinking water;
- Secure energy supply and distribution;
- (x) Reduce raw material and resource consumption, Ensure efficient use of natural resources;
- (x)Contribute to climate change mitigation and societal adaptation;
- (x) Contribute to a healthy living environment;
- Ensure secure infrastructure

a. If applicable, what additional, other or alternative challenges would you suggest/prefer?

- securing drinking water –specifically groundwater clean at the source
- healthy living environment – specifically indoor air quality affected by vapour intrusion
- Securing the ecosystem as affected by flux from contaminated groundwater reaching surface water bodies

8. Starting with your own experience: which <u>specific topics</u> (research needs) should be included in the SRA?

8.1 Vapour intrusion from contaminated soil or groundwater into buildings with sensitive area use such as dwellings or institutions for child care

a)

- *Who will be affected?:* the people living in the houses or users of the institutions are affected by the vapour intrusion of gaseous phase contaminants in particular chlorinated solvents.
- *Who is responsible?:* In case of orphan site contaminations – mostly the case - the regional authority is responsible for securing the indoor climate from the effect of contaminated soil and groundwater.
- *Is it a topic of concern of your organisation / department?:* Yes

- *Is it only a national topic, or a shared topic by multiple countries?:* We presume this is a general issue, but of cause it depends on the national definition of responsibility and guideline values – but also perception of acceptable risk relative to other sources of contamination of indoor air.
- *Where are we now, where do we want to be in x years (point on the horizon)?* It is difficult to isolate the effect on indoor air by vapour intrusion from other sources. It is desired to fix the issue using a safe, maintenance free solution, where by monitoring and operation is not required. A ventilation solution might be build in to the HVAC system of the house, so to combine several solutions. It is a challenge identifying pathways. It is a challenge to break the pathway perpetually. Membranes are destroyed by age or reconstruction. Horizontal barriers may be considered. Multiple tracers can be used to identify pathways. Or an outwards pressure gradient could be secured. Insitu solutions not affecting the house would be ideal, but they are often costly and rather invasive.
- *How can the newly gained knowledge be effectively used?*: The knowledge should be able to secure sensitive area use cheap, once and for all, and without monitoring or operational requirements.

b)

This is a high priority.

c)

- The funders should be a consortium of problem owners and solutions providers matched with the appropriate fund – national or EU – depending on the nature of the specifically involved parties. We also include import/ export as an objective in the list below, as we consider the combined target of environmental benefit and development of green business.
  - *Assessment of land resources*
  - *Potential productivity of land and soils*
  - *(x) Demand for soil/land resources, imports and exports*
  - *Competition between land uses (land-use conflicts)*
  - *(x) Concepts to identify and quantify relevant impacts*
  - *(x) Instruments to avoid / minimise impacts (feedback to decision-making process)*
  - *Opportunities of innovative land-use technologies*
  - *Resource-oriented land management systems]*
  - *Soil regeneration*
  - *(x) Soil and groundwater remediation*

8.2 Pesticide contamination of groundwater

a. Explain – elaborate the topic

- *Who will be affected?* : Traditionally the guideline values of pesticides are set at 0.1 µg/l, which used to be the detection limit. This is not a toxicology based value, but a political choice. Denmark is basing its water abstraction on naturally pure groundwater, which is not supposed to undergo chemical treatment before distribution, which incidentally is also costly. The people affected by pesticide contaminations of the groundwater resource are the water consumers.
- *Who is responsible?:* In Denmark, the soil act distinguishes between a point source contamination, which is included in the act, and contamination related to general agricultural use of pesticides, which is not subject to the soil act. As this was also the setup in the proposal for the Soil Framework Directive, we believe this is general to the EU legal model. If it is an old (before 2000) point source pollution, it is the responsibility of the regions. If it is a new point source pollution it is a polluter pays case, which is handled by the municipality. The same goes for contamination resulting from regular pesticide use.
- *Is it a topic of concern of your organisation / department:* Yes.
- *Is it only a national topic, or a shared topic by multiple countries?:* Two factors combine to make this a priority issue in Denmark: the intensity and historical ubiquity of agriculture and the exclusive reliability on groundwater as supply. Other areas of Europe may face a similar combination, such as northern Germany, Netherland and Flanders. But if it is seen as an issue or not also has to do with the willingness of the population to either allow low concentrations of pesticides in their drinking water or clean it after abstraction.
- *Where are we now, where do we want to be in x years (point on the horizon)?*: Methods are needed for remediating pesticides, which is something, we have done little of before. Especially pesticides in the plume is a challenge, because of its wide dispersion and the low concentrations. As we cannot legally do something about diffuse pesticide contamination resulting from regular use, we need improved tools for distinguishing point sources from diffuse sources. We need tools to screen cheaply, because of the immense amount of potential point sources, the classical approach of historical due diligence cannot be applied indiscriminately. The effect of combining various low concentrations of various pesticides is unknown.
- *How can the newly gained knowledge be effectively used?*: The field of pesticides in soil contamination is new. The challenge needs to be defined as a more specific level, so that the scope of a pesticide project is limited and specific. we should only develop something, which there is a market for, otherwise it will not be implemented.
-

b. Priority:

This is a high priority in Denmark.

c. Who wants to/should fund this kind of research?

As 8.1

8.3 Remediation in low permeable geology

a. Explain – elaborate the topic

- *Who will be affected?* : Low permeable geology is mostly a challenge where excavation is not considered an option. This may be because of buildings occupying the site or the depth of the hot spot. The people affected are the inhabitants affected by vapour intrusion from the contamination or the threat of downstream water abstraction.
- *Who is responsible?:* In case of orphan contaminations - mostly the case - the regional authority is responsible for securing a pure groundwater resource. Where a developer is responsible he will mostly use excavation due to speed and the need for documentation.
- *Is it a topic of concern of your organisation / department* : Yes
- *Is it only a national topic, or a shared topic by multiple countries?:* This will depend very much on the geology of the specific region of a country.
- *Where are we now, where do we want to be in x years (point on the horizon)?*: Energy use in thermal methods are costly. Achieving geotechnical stability after thermal remediation or soil mixing is a challenge. It is difficult to ensure contact between reactants and contaminants, it is hard for the reactants not to react prior to reaching their target. Horizontal distribution is a problem. There is a need for long lasting (75 year +) reactants. In situ methods are often not competitive because of the time needed, so faster methods are needed.
- *How can the newly gained knowledge be effectively used?*: If techniques developed are integrated in commercial technology and acknowledged by the problem owners, the knowledge will be used.
-

b. Priority:

This issue has not been ranked yet

c. Who wants to/should fund this kind of research?

As 8.1

8.4 Investigation methods

a. Explain – elaborate the topic

- *Who will be affected?* : The public or private owner of the investigation
- *Who is responsible?:* consultants and entrepreneurs
- *Is it a topic of concern of your organisation / department* :

- *Is it only a national topic, or a shared topic by multiple countries?:*
- *Where are we now, where do we want to be in x years (point on the horizon)?*: Inhomogeneous geology poses a challenge for representative sampling. It would be desirable to be able to connect a contamination with a specific source or with multiple sources. This would help prioritising the remediation target as well as the responsible party. This could be done using finger printing of a contamination. A methodology determining the age of a contamination could give a similar indication, and it could also be used to identify responsibility, which in most MS is based on the when the contamination took place. Especially early phase investigations leave us with a high degree of uncertainty, because the price of drilling and sampling only permits for very few samples to be taken. So screenings tools, cheaper and faster methods are desired. In clay and low permeable strata it can be hard to analyse for substances in the aqueous phase. Passive samplers could be the answer. At times it can be hard to take samples underneath existing buildings, so more compact, controlled direction equipment is needed. Higher resolution of geophysical tools – usually developed for larger scale and deeper geology could be useful. There is a great need for a 3D vision of the subsurface including the extent of the contamination. Possibly this could be approached by integrating several geophysical tools with geochemical or optical sensors and other tools. Auto-processing of massive data amounts would also be needed. There is a need for cheaper on- site analysis of concentrations in various media. Methods are needed to estimate the concentration of free phase. Possibly we need to look at total screening of estranged compounds on site rather than analysing for specific compounds. If a “human toxicology screening” was possible, it would be preferable. This brings down the risk, that we have to revisit sites in the future – as for instance with PFOS. All original data must be saved including the chromatogram, for future readings, based on new knowledge. We need to collect data real time, making sure it goes directly from the sensors, the probe and the observer in the field to the database, and not necessarily via a laboratory. An auto sampler could go directly to a measuring device. Remote controlled automated drilling could lower the price of drilling. If probes could be made cheaper and mass produced, they could be left in the well for continuous measurements. This would also allow for a much faster risk assessment.
- *How can the newly gained knowledge be effectively used?*: Especially in this theme, it is essential that an entrepreneur is taking the lead in a project consortia. It is essential that the individual development objective of a project is limited and precise. Legal demands on accreditation and use of specific methods are blocking the application of new techniques.

b. Priority:

This is a high priority mostly because of the commercial potential in combination with the possibility of specific development objectives, which can lead to solutions imminently implementable.

c. Who wants to/should fund this kind of research?

As 8.1

8.5 Groundwater contamination i Limestone aquifers

a. Explain – elaborate the topic

- *Who will be affected?* : The water consumers
- *Who is responsible?: the regions*
- *Is it a topic of concern of your organisation / department* : Yes
- *Is it only a national topic, or a shared topic by multiple countries?:* Depends on geology. The dominating aquifer of eastern Denmark is limestone and chlorinated solvents and pesticides are of particular concern.
- *Where are we now, where do we want to be in x years (point on the horizon)?*: Delineating deep plumes is a challenge. The fracture and dispersion pattern in a limestone aquifer differs from sediments, and the chemical properties are different. Our experience on sedimentary aquifers has to be tested on limestone.
- *How can the newly gained knowledge be effectively used?*: Pilot and full scale studies and models.

b. Priority:

This issue has not been ranked yet

c. Who wants to/should fund this kind of research?

Such projects are mostly driven by authorities & research institutions. As 8.1

8.6 Risk assessment modelling considering flux and natural attenuation

a. Explain – elaborate the topic

- *Who will be affected?* : The ecosystem as well as human health and groundwater resources
- *Who is responsible?:* The Nature Protection Agency, the regions and partly the municipalities
- *Is it a topic of concern of your organisation / department* : Yes
- *Is it only a national topic, or a shared topic by multiple countries?:* Many countries have risk assessment systems as well as politically based criteria and accept of risk. We are uncertain what other countries are doing especially in relation to flux from contaminated groundwater in to surface water.
- *Where are we now, where do we want to be in x years (point on the horizon)?*: We are uncertain about the extent of attenuation on the ground-surface water interface and about the relation between chemical concentrations and biological status. We are uncertain about natural attenuation vertically and how this may be included and documented in a risk model.

- *How can the newly gained knowledge be effectively used?*: Comparison of risk models and risk assumptions before implementation in the national models.

b. Priority:

This issue has not been ranked yet

c. Who wants to/should fund this kind of research?

This is mostly an administrative issue which can be solved in cooperation with research institutions – preferable transnational. Otherwise as 8.1

8.7 Alternatives to or optimisation of pump and treat

a. Explain – elaborate the topic

- *Who will be affected?* : The owners of the P&T units.
- *Who is responsible?:* Generally the regions are the problem owners, but some water works are also operating pump & treat facilities to fixate a groundwater contamination.
- *Is it a topic of concern of your organisation / department* : Yes
- *Is it only a national topic, or a shared topic by multiple countries?:* Supposedly. It depends on how wide spread the use of P& T is. A determining factor is also what tax is levied on discharging waste water to a public sever. If the discharging entity does not pay anything, no treatment of cause is needed. We have had the experience, that operation and maintenance has taken an increasing part of our budget.
- *Where are we now, where do we want to be in x years (point on the horizon)?*: P&T units are costly to build and to operate. In particular carbon filters constantly needs replacement, and pumping is energy consuming especially over as the operating period can be decades. Alternatives or supplement to carbon filters are sought. Self-cleaning pumps or plumps not clogging are sought. Back diffusion is time consuming. Approaches eliminating the need for P&T entirely are also sought. A higher degree of automation may make operation cheaper. Much water contains a high concentration of TOC, if we could remove it we could make existing units more effective.
- *How can the newly gained knowledge be effectively used?*: The business case must be proven in comparison to traditional setups. Many incremental solutions are possible making concrete products and results very achievable.

b. Priority:

This issue has not been ranked yet

c. Who wants to/should fund this kind of research?

As 8.1

8.8 Sustainable alternatives to dig and dump

a. Explain – elaborate the topic

- *Who will be affected?* : neighbours, entrepreneurs, global climate
- *Who is responsible?:* Private developers and public authorities regarding orphans sites
- *Is it a topic of concern of your organisation / department* : Yes
- *Is it only a national topic, or a shared topic by multiple countries?:* The price consideration for dig and dump compared to on-site remediation is highly influenced by the population density and hence the availability of clean soil and nearby areas available for deposition. Even considering the transport cost of large soil volumes, it is hard for an on-site remediation to compete with a landfill. So the issue is also influenced by regulation of landfill taxes.
- *Where are we now, where do we want to be in x years (point on the horizon)?*: Mobile cleaning units have been around for decades, but have largely been too energy consuming, too slow or too burdensome for neighbours – either because of noise, exhaustion or size. These are the challenges having to be dealt with in a mobile clean up unit.
- *How can the newly gained knowledge be effectively used?*: The challenge here, is to implement alternatives to dig and dump with private entrepreneurs. To do this, alternative technology most be price competitive. Another regulatory option is to make deposition relatively more costly. A public authority may on its own account choose an on-site solution, but to justify this it must at least be able to prove the environmental benefit of this – relative to price – using a life cycle analysis.

b. Priority:

This issue has not been ranked yet

c. Who wants to/should fund this kind of research?

As 8.1, but the driving force here should be an entrepreneur.

9. Linked to topics mentioned by the NKS:

a. What are the important / relevant documents, research agendas, research programmes underpinning these topics? (state-of-the-art)

Danish Soil Partnership is running a process identifying the key physical challenges faced in the five regions regarding soil contamination. It is the intention to initiate a number of innovation projects aimed at these challenges through the period January 2016 to December 2018.

GEOCON – Advancing GEOlogical, geophysical and CONtaminant monitoring technologies for contaminated site investigation. GEOCON includes the following partners: DTU, AU, GEUS, University of Bonn, Lund University, Kansas University, Orbicon, The Region of Southern Denmark, Central Denmark Region.

The program has been running since October 2014.

http://www.geocon.env.dtu.dk/

b. Related to these agendas and programmes: what are timelines of programming and windows-of-opportunities to influence agendas / programmes?

The mapping process of key technical challenges in Denmark will have a first draft ready 1st October 2015. From this point a more detailed problem formulation will be elaborated within chosen categories based on the priority of the regions and interest third parties such as solution providers and universities.

E. Science-Policy-Interfacing (SPI)

10. How would you define 'scientific knowledge'?

Information about the nature of a cause-effect – delivered with a high degree of certainty as supported by empirical evidence

11. For what do you use scientific knowledge in your job?

We apply it for applying solutions from the lab – or from other sectors – within our field to investigate and remediate better, cheaper and with a higher degree of certainty.

12. Which sources of (scientific) knowledge do you use for doing your job?

[Open question and you can mention some of the sources underneath as examples]

- *scientific paper*
- *(x) consultants*
- *(x)reports*
- *(x)colleagues*
- *(x)experiences /examples within my own country*
- *experiences /examples abroad*
- *newspapers*
- *television*
- *(x)conferences Involvement in research projects*
- *data (bases)*
- *websites, such as: …..*
- *other, specify: …..*

13. To what extend do you use most recent/new scientific knowledge (i.e. state-of-the-art scientific insights/findings) for doing your job?

In the regional authorities, we use scientific knowledge indirectly, as we depend mostly on consultants having access to this information. Some projects are done in cooperation with universities.

14. To what extend are you able to influence (and how) the setting of scientific research policies/agendas in our country?

    Very limited. But we include universities in our own development projects.

15. To which extend do our national policies/agendas reflect your specific needs and priorities?

    Very limited, as soil contamination is a small field. We include innovation in our own problem solution.

16. To what extend has been made use of the state-of-the art in scientific research for the formulation of existing policies in our country?

    Don't know.

[Questions only for NKS from the non-science sector (business and policy):]

17. Have you ever been involved in:

    a. *the formulation of scientific research questions?*: Yes

    b. *doing scientific research (i.e. knowledge co-creation) ?:* Yes

    c. *synthesizing/wrapping-up of scientific knowledge, e.g. to feed into policy making or to increase business opportunities?:* yes

[When yes: Follow-up questions]

- How successful/satisfying was this, on a scale of 1-5?
    1. *Very successful/satisfying*
    2. *(x)Successful /satisfying*
    3. *Neutral*
    4. *Unsuccessful/unsatisfying*
    5. *Very unsuccessful/unsatisfying*
- *What went well:* disseminating the conclusions and the knowledge of a finding
- What could be improved?: the willingness of makers of policy, law and public bidders in considering a broader range of issues when choosing contract award criteria, setting standards for documentation, assessment and methodology. The secondary policy objectives of creating jobs, business opportunities, sustainability, innovation etc. often falls prey to securing the stated objective of a certain legal act.
- What to avoid/not to do?: do not develop a solution without a marked
- Additional remarks?: we need to consider this in a trans-national perspective. This field is too small to define a well-functioning market – at least in a country like Denmark.

[Question only to NKS who are likely to have insights here (e.g. research funders)]

18. (How) is the societal impact of scientific research related to the scope of INSPIRATION being assessed in our country?

We would like to see projects developing into concrete products. For this reason we will typically select rather mature research topics for development as opposed to basic research. Often innovation will be preferable to research: applying a well know technique from another area to a new field.

[If they know: Follow-up questions:]

- How successful/satisfying is this, on a scale of 1-5?
  1. *Very successful/satisfying*
  2. *Successful/satisfying*
  3. *Neutral*
  4. *Unsuccessful/unsatisfying*
  5. *Very unsuccessful/unsatisfying*
- What indictors are used?
- What goes well?
- What can be improved?
- What to avoid/not to do?
- Additional remarks?

19. Which national Science-Policy-Interface documents do you know of / can you recommend?

Don't know

F. Funding

20. Which experiences and expectations in funding schemes (public / private) do you have in your own field that could offer opportunities for future research on land-use and -management and related impacts to Soil-/Sediment-/Water-systems:
    - *Sub-nationally /regionally?* Regional Growth Fora.
    - *Nationally?* The DEPA environmental technology fund (TUP), DEPA's Environmental development and demonstarion fund (MUDP), Innovationsfonden, InnoMT bubble projects, The Market Development Fund
    - *European?* Interreg, H2020, LIFE+,
    - International? We have no experience with international funds.

21. How to increase the added value of different financial resources (i.e. achieve a multiplier) for doing research that contributes to EU and national demands, in particular to the R&I demands on Land and the SSW-system?
[*CONSTRUCTIONS that (could) work. PP, PPI, etc. Just ask for, as open as possible for suggestions, ideas, experiences, good examples*]

    It should be possible to fund projects from more than one fund with especially larger projects, where the budget perhaps cannot be met using only one co-financing source. There is a fine balance between adding more co-financing partners and economics of descale. In a EU fund application context it can be an advantage in an application to add useless partners to a project just to ensure regional representation. Participation should be based on merit, not geography. The EU Public Procurement Directive can have undesired effect on innovative procurement, because a solution provider is discouraged to disclose an idea in a co-creation process without a guarantee to be included in the downstream bid. The effect of the latest directive amendment is unknown in DK, where it has still not been implemented. For this reason a legal adviser is often needed, and we have found some help in developing standard agreements and models for PPP and PPI.

22. Are there areas of research and innovation (R&I) that you are aware of that are not (yet) covered by current funding mechanisms and which would need new/different funding schemes / infrastructures? To our knowledge it is generally difficult to get funding for late-stage innovation, where a prototype is in place, but there is still not created a market access.

23. Integrated approaches (necessary for addressing particular societal challenges related to the use and management of land and related impacts to SSW systems) are usually difficult to fund / get recognised by the research funding communities. What would be necessary to improve this?

    We suppose this has to do with the categories and the objective defined in the funds.

24. Based on previous learning experiences that you are aware of: how to best set up / govern funding option(s), so that societal demands will be fulfilled, knowledge resulting from execution of the SRA will be taken up and used; and funders experience that their invested, national Euros are indeed multiplied?

    It has to do with defining the larger project as an integrator of existing identified needs with in the participating organisation – not as something additional. A good project either has offspring projects as a result – or a change in practice and behaviour. The outcome/ effect of a project should be measured in how the results are integrated in to the organisations driving the project. The project must have a driver, the most suitable is often the entrepreneur.

[if they know: Follow-up questions]

- How successful/satisfying was this, on a scale of 1-5?
  1. *Very successful/satisfying*
  2. *Successful/satisfying*
  3. *Neutral*
  4. *(x)Unsuccessful/unsatisfying*
  5. *Very unsuccessful/unsatisfying*
- What went well
- What could be improved? The business case should be improved. Curiosity is not a market. The problem owners have to be committed, but it is difficult, because they cannot be legally bound to actually purchase the product they have been co-developing.
- What to avoid/not to do? Compromise to secure happiness of all partners. It is better to lose some.
- Additional remarks?

G. Other (remarks, suggestions, examples):

The above inputs are delivered by Danish Soil Partnerhip based on the outcome of five work shops held in the five regions of Denmark. As the task of the regions only include the issue of contaminated sites – other issues regarding broader soil issues such as erosion, spatial planning etc. has been neglected in this questionnaire.

A synthesis of the most acute challenge faced by the regions within the area of managing contaminated is currently being produced. The objective is to identify problem owners in other European Countries capable and willing of co-investment and co-development up against the identified priority issues.

The Danish Soil Partnerhip is an initiative taken by the regions in order to promote business and innovation in the field of contaminated soil and groundwater. The secretariat is hosted by the organisation Danish Regions.

H. Ending the interview

Thank you for taking the time to participate in this interview:

- Would you like us to keep you updated about INSPIRATION progress?
- Would you suggest anyone else who we should be interviewed by us?
- Do you have further questions arising from this interview, or would you like to add anything else?

- What information are you interested in, and willing to give feedback on?

  [Discuss the feedback mechanism and if they have expressed their opinions as a person or as a representative of their organisation/network. Checklist:]

  a. Information to exchange / willingness to give feedback on:
     - (complete interview, not recommended)
     - summary of main conclusions
     - national report, national contribution to D2.4
     - complete D2.4, all countries

  b. Preferred level of feedback:
     - no feedback
     - informal feedback
     - formal feedback (e.g. on behalf of represented organisation)

  [Check: have you discussed consent form / how to refer to interviewee]

Annex II: Documents used for the desk study

Witboek Landbouwonderzoek - Departement Landbouw en Visserij

Afdeling Monitoring en Studie**,** *Van Gijseghem Dirk, Piessens Inge, Vuylsteke Anne, Maertens Ellen, Vandenbroeck Philippe, Goossens Jo,* downloadbaar in pdf-formaat op www.vlaanderen.be/landbouw

http://www.ruimtelijkeordening.be/NL/Diensten/Onderzoek/Onderzoeksagenda

Onderzoeksagenda Platteland - uitgebreide versie - Platform voor plattelandsonderzoek, opgemaakt door VLM – februari 2014

Onderzoeksprogramma ter ondersteuning van het Vlaamse milieubeleid - Opgemaakt door het Departement Leefmilieu, Natuur en Energie i.s.m. de Vlaamse Landmaatschappij, de Vlaamse Milieumaatschappij en de Openbare Vlaamse Afvalstoffenmaatschappij, mei 2015

Annex III: Mentioned SPI initiatives around soil and land use in Belgium

SPI in the Agricultural sector (some mentioned initiatives)

Agriculture Practice Centers translate results of fundamental research into applied practices

The Agriculture Education service brings policy measures to farmers, communicates with the practice centers and the farmers organisations, organizes seminars for farmers and captures the questions and worries of the farmers

The Platform Agrolink brings together the research institutes on agriculture research.

Policymakers try to foster cooperation between research institutes, farmers and authorities through the Platfom for Agricultural Research (Flanders)

Platform on European level: Standing Committee on Agricultural Research (SCAR)

Vulgarization of the scientific research findings for farmers: via VILT and the “Countryside”-TV channel

The best way to convince people is to have personal contact and to show empathy.

SPI in Industrial sector (some mentioned initiatives)

NICOLE network: European network of industry and service providers on contaminated land

SPI in policy sector(some mentioned initiatives)

Common Forum: European network of policymakers on contaminated land

SPI in spatial planning sector (some mentioned initiatives)

Steunpunt “Ruimte” and “Ruimte en Wonen” brings together all stakeholders on these topics and discusses e.g. on research needs

Annex IV: List of regional, national, European and international funding schemes

	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
Regional				
1	Prevention and Remediation Fund for Environment and Nature (MINA)	Flemish government	The MINA-fund is both fed by the Flemish revenues from environmental taxes, fines and fees (polluter pays principle) and by a grant from the Flemish government. A lot of research commissioned by the Flemish government within the environmental domain is financed through this fund.	ebl.vlaanderen.be/publications/documents/77056
2	Applied Scientific Research Program on Environment (TWOL)	Flemish government	This public research program is prepared annually by the Department of Environment, Nature and Energy of the Flemish government and includes all planned and strategically important policy studies on environmental issues. The TWOL program is approved by the Flemish Minister for Environment and funded by the various environmental agencies.	ebl.vlaanderen.be/publications/documents/74536
3	Innoviris	Brussels government	Innoviris is the Brussels institute for the encouragement of scientific research and innovation. The institute supports and stimulates research, development and innovation through the funding of innovative projects by companies, research organisations and the non-commercial sector.	www.innoviris.be
4	Flemish Program for Rural Development (PDPO)	Flemish government / EU	The 3rd PDPO for the period 2014-2020 focuses on young farmers, the future of farming, innovation, education, resilience and sustainability in the agricultural sector, and improving the viability of rural areas.	lv.vlaanderen.be/nl/landbouwbeleid/plattelandsontwikkeling

5	Agency for Innovation by Science and Technology (IWT)	Flemish government	IWT stimulates knowledge development in companies, research institutions and government agencies by providing financial support, advice and coordination. The agency annually distributes 300 million euro in grants, partly through its own funding programs, partly as intermediary of the Flemish government to which it provides support, monitoring and financial management.	www.iwt.be
6	Special Research Fund (BOF)	Flemish government	The BOF is funded through a grant from the Flemish government and supports basic and strategic research conducted at Flemish universities and colleges. The distribution of the funds over the different research institutions depends on a formula that includes the number of master degrees, doctoral degrees, publications and citations. Every knowledge institution has to co-finance research funded by BOF with own resources.	www.ewi-vlaanderen.be/wat-doet-ewi/excellerend-onderzoek/financiering-van-onderzoek/bijzondere-onderzoeksfondsen
National				
1	Research Fund – Flanders (FWO), Fund for Scientific Research (FRS-FNRS)	Flemish, Walloon and Federal government, National Lottery, donations.	Both federal research funds finance fundamental scientific research mainly by supporting individual researchers through fellowships. The FWO operates in Flanders, the FRS-FNRS in the Wallonia-Brussels Federation.	www.fwo.be
2	Belgian Science Policy Office (BELSPO)	Federal government	BELSPO is the federal coordinating office for the Belgian science policy. By managing some major research programmes it provides the Belgian government reliable, validated data, allowing it to take decisions with full knowledge of the facts in areas such as sustainable development, climate change, biodiversity, energy, health, mobility and the information society.	www.belspo.be

3	VLIR-UOS	Federal government	VLIR-UOS is financed by a grant from the Belgian development aid budget. It supports cooperation projects between professors, researchers and teachers. VLIR-UOS also awards scholarships to students and professionals in Flanders and the South. The fund also helps to strengthen higher education in the South and the globalisation of higher education in Flanders.	www.vliruos.be
4	Luxembourg National Research Fund (FNR)	Luxembourg government	The Luxembourg National Research Fund (FNR) is the main funder of research activities in Luxembourg. The FNR invests public funds and private donations in research projects in various branches of science, with an emphasis on selected core strategic areas. Furthermore, the FNR supports and coordinates activities to strengthen the link between science and society and to raise awareness for research. It also advises the Luxembourg government on research policy and strategy.	www.fnr.lu
European				
1	Interreg	EU	Interreg is a program for European regional development and promotes cross-border, transnational and interregional cooperation. The program aims to strengthen economic and social cohesion across the EU.	ec.europa.eu/regional_policy/nl/policy/cooperation/european-territorial/

2	European Regional Development Fund (ERDF)	EU	The ERDF is a structural fund that stimulates economic, social and territorial cohesion within the European Union. Funding priorities include modernising economic structures, creating sustainable jobs and economic growth, research and innovation, environmental protection and risk prevention. Investment in infrastructure also retains an important role, especially in the least-developed regions. All actions should contribute to the objectives of the Europe 2020 strategy for smart, sustainable and inclusive growth.	ec.europa.eu/regional_policy/en/funding/erdf/
3	Joint Programming Initiatives (JPI)	EU	The objective of these JPI's is to increase the value of relevant national and EU R&D funding by concerted and joint planning, implementation and evaluation of national research programmes. There are JPI's on themes like agriculture, food security, urban development, climate change or water.	ec.europa.eu/research/era/joint-programming-initiatives_en.html
4	Rural Development Programs (RDP)	EU	The aim of the Rural Development Programme (RDP) which is financed by the European Agricultural Fund for Rural Development (EAFRD) and national or regional authorities, is to improve the quality of life in rural areas and to encourage diversification of the rural economy.	ec.europa.eu/agriculture/rural-development-2014-2020/index_en.htm
5	European Innovation Partnership (EIP)	EU	The EIP's are a new approach to EU research and innovation. By bringing together actors from the entire research and innovation value chain they aim at streamlining efforts and accelerating market take-up of innovations that address key challenges for Europe on themes like water, raw materials or agricultural sustainability and productivity.	ec.europa.eu/research/innovation-union/index_en.cfm?pg=eip

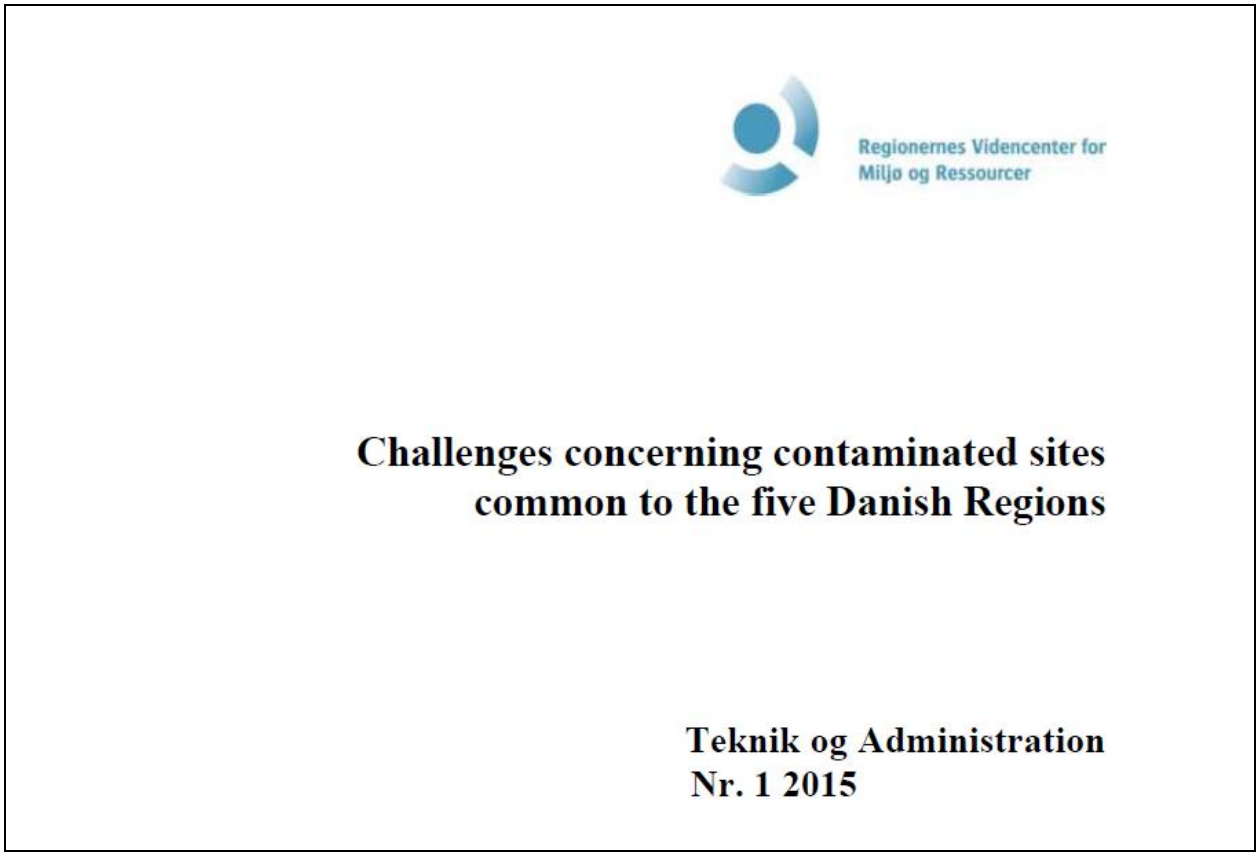
6	European Research Council (ERC)	EU	The ERC's mission is to encourage the highest quality research in Europe through competitive funding and to support investigator-driven frontier research on the basis of scientific excellence. The ERC complements other funding activities in Europe such as those of the national research funding agencies, and is a flagship component of Horizon 2020.	erc.europa.eu
7	European Science Foundation (ESF)	EU	ESF helps its member organisations collaborate internationally on research programmes that it coordinates in almost every scientific domain. ESF provides services to the science community, including peer review, evaluation and conferences, as well as support career tracking.	www.esf.org
8	Marie Skłodowska-Curie Actions (MSCA)	EU	MSCA support research training and scientific career development focused on innovation skills. The programme encourages transnational, intersectoral and interdisciplinary mobility. The MSCA is the main EU programme for doctoral training and finances 25.000 PhDs.	ec.europa.eu/research/mariecurieactions/
9	SNOWMAN	OVAM, DLNE, ADEME, MEDDE, Naturvardsverket	SNOWMAN is a European network of research funding organisations that has launched four calls and funded 17 projects related to soil and land management.	snowmannetwork.com
10	LIFE+	EU	LIFE+ is the EU's funding instrument for the environment and climate action. The general objective of LIFE+ is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value.	ec.europa.eu/environment/life/

11	ERA-net	EU	The ERA-net instrument under Horizon 2020 is designed to support public-public partnerships in their preparation, establishment of networking structures, design, implementation and coordination of joint activities as well as topping up of single joint calls and of actions of a transnational nature.	ec.europa.eu/research/era/era-net_en.html
12	European Observation Network Territorial Development and Cohesion (ESPON)	Mainly EU	The ESPON 2020 Programme aims at promoting and fostering a European territorial dimension in development and cooperation by providing evidence, knowledge transfer and policy learning to public authorities and other policy actors at all levels. ESPON 2020 has a total budget of 48,7 million EUR of which 41,4 is contributed by the EU.	www.espon.eu
International				
1	Bill & Melinda Gates Foundation (BMGF)	Bill Gates & other donators	With financial resources up to 42 billion dollar, the BMGF is the largest private foundation in the world. The foundation funds and promotes research on improving health and global development, and also has divisions dedicated to education and equal rights in the US, and global advocacy.	www.gatesfoundation.org
2	Organisation for Economic Co-operation and Development (OECD)	Member countries	The OECD has a Co-operative Research Programme (CRP) for the funding of research fellowships and international conferences (workshops and symposia). The CRP supports work on the sustainable use of natural resources in agriculture, fisheries, food production, forestry, and research into new technologies in these areas.	www.oecd.org

Annex V: Participant list workshop

Name of the entity	Contact person
SPAQUE	Claudia Neculau
KU Leuven	Chris Kesteloot
KU Leuven	Anton Van Rompay
VEB vzw	Karen Van Geert Pieter Schrooten
VITO	Guy Engelen
Service Public de Wallonie	Ester Goidts
ISSEP	Simon Garzaniti Robin Lambotte
Universiteit Antwerpen	Jan Staes
Universiteit Hasselt: Centrum voor Milieukunde	Bernard Van Heusden
Université Liège/Gembloux	Jean-Thomas Cornélis
Vlaamse LandMaatschappij	Carole Ampe
Vlaamse LandMaatschappij	Frank Stubbe
LNE-ALBON	Joost Salomez
Bioforum	An Jamart
Instituut voor Natuur- en Bosonderzoek	Bruno Devos
OVAM	Johan Ceenaeme
OVAM	Eddy Wille
CIW WG bagger- en ruimingsspecie (SEDNET)	Astrid Vosselen
Umicore (NICOLE)	Lucia Buvé
De Watergroep	Simon Six
Haven van Antwerpen	Agnes Heylen
Univ UCL: Terre et climat	Bas Van Wesemael
Union des Villes et Communes de Wallonie	Gwenael Delaite
Espace environnement	Nicolas Rochet
Solvay (NICOLE)	Roger Jacquet
Ministère du Développement durable et des Infrastructures de Luxembourg	Sophie Capus
Luxembourg Institute of Science and Technology	Benedetto RUGANI
Danish regions	Christian Andersen
Ruimte Vlaanderen	Peter Willems

Annex VI: Programme Danish Soil Partnership



Report publicly availbale at:

http://miljoeogressourcer.dk/filer/lix/4660/Challenges_concerning_contaminated_sites_common_to_the_five_danish_regions.pdf

Or see:

Danish Soil Partnership (DSP): http://danishsoil.org/index.php

Publications: http://danishsoil.org/pages/publications.php

4. Czech Republic

Report by Petr Klusáček, Stanislav Martinát, Bohumil Frantál

4.1 Executive summary

4.1.1 English version

On the basis of interviews and workshop important challenges for society from the perspective of stakeholders (NKS) were defined. These challegens can be divided into three main core research questions: a) How not to threaten (how to save) production functions of soils for future in conditions, when current agricultural and forestry activities are primarily oriented on achieving only short-term profits (e.g. generation of profit by means of subsidies for planting energy crops, which causes increased degradation of soils by erosion, decrease of organic materials in soils etc.)?; b) How to achieve the optimal non-productive functions (for example environmental functions, recreational functions, esthetical functions)?; c) How to regulate the consumption of soils and landscape for building activities or how to increase re-development on brownfields (previously developed lands) and decrease development on greenfields?

As the most important research needs bellow mentioned topics were identified (on basis of data gathered during interviews and workshop)

CZ-1: Urban sprawl and consequent land-use changes in the hinterland of big cities

specific research questions

Improving the process understanding – and improvement of sharing of that understanding – of the development on greenfields; Developing/testing/demonstrating new technical solutions for building activities on greenfields respecting needs of SSW systems; Social costs and benefits of development on greenfields, identify the examples of “best practices” or demonstration project from other EU countries and from Czech Republic

CZ-2: Contaminated sites as heritage of the 20th century and how to deal with them

specific research questions

There is need of research of brownfields and development of holistic and transdisciplinary approaches including the perspective of different and stakeholders; Improving the process understanding – especially improvement of understanding of roles of the different public administration; Improve research focused on best practises and demonstration projects related to both contaminated sites and brownfields. Use innovative solutions

CZ-3: Recent agricultural decay in the Czech Republic and possible food (in-)security

specific research questions

Agricultural production for food is significantly crowded out by other non-food production (energy crops), which significantly influences future food (in-)security of the country; Animal husbandry has been strongly reduced, which is one of the reason for lack of organic matter in soils; There was increase of efficiency by means of new modern

vehicles (tractors), which caused increase of intensity of soil sealing and decrease of permeability of soils

CZ-4: Adoption to climate change (extreme climatic events – droughts, floods etc.)

specific research questions

There is need of research integrating productive and environmental perspective of soil management; Improving the process understanding – especially improvement of understanding of roles of the different bodies of public administration; Improve research focused on best practises and demonstration projects related to both floods and droughts

CZ-5: Improving quality of soil-sediment-water (SSW) system

specific research questions

Improving the process understanding – especially improvement of understanding of roles of the different bodies of public administration in SSW system; Improve research focused on best practises and demonstration projects supporting both productive and environmental function of landscape

CZ-6: Regeneration of urban space and current urban spatial risks

specific research questions

Relations of population to public spaces in cities need to be more researched to learn more; Marketing of cities/urban regions is the topic, which needs more attention. This is mainly case of rather smaller cities; Alternative to the suburbanisation could be concept of the compact city, which can be achieved by several methods – by increase of average high of buildings (cities should grow up) or by new building development on the previously develop lands

CZ-7: Renewable energy vs. fossil fuels in the Czech Republic

specific research questions

Decentralized projects for generation of renewable energy, where energy is locally both produced and consumed should be supported; Energy use of households and municipal wastes. Enormous energy potential of waste is nowadays overlooked; Spatial distribution of individual types of renewable energies should be more researched and adopted to natural/social/environmental conditions

CZ-8: Sustainable use and renewal of population´s relation to soil and landscape

specific research questions

Relation of population to soil and landscape shall be renewed and significantly improved. This could be achieved by set of wisely implemented educational and research actions; More attention should be devoted to environmental education in primary schools. Interactive and smart environmental games could be attractive way how to make environmental education more attractive for school kids.

Part of study focused on science-policy interface brought several important points – I) problem with identification, formulation of research questions and funding of research, whose solution might be beneficial for whole society. This is caused by short-term thinking of

decision makers, who strongly rely on political decisions. If horizon of planning for decision makers is reduced just for four years (which is election period), quick results are expected. Such approach was evaluated as short-sighted due to needs of long-term strategy for research in the Czech Republic. II) Another problem has been seen in limited visibility of results of research. It is quite usual that methodologies are developed and certified, but never used in reality. Some more clear communication of research results to public and administration bodies would be useful. It would be also useful to support so called pilot project, which could verify and more develop result of previous research without pressure to earn immediately money.

Part of study foucsed on funding options derived these remarks. As very frequent problem of research in the Czech Republic lack of financial sources in this sector was mentioned. Due to historical reasons research in the Czech Republic is developed in several clusters with sometimes mutual competing tendencies (universities, academy of sciences), which harms whole research sector. Administration burden connected to projects is usually enormous and should be reduced. This opinion was quite frequent, on the other hand, it was obvious, that this complain rises from situation at rather smaller research institutes and universities, where building of special department, which is primarily specialized on administration support for projects, is usually at beginnings. It might be also beneficial, if projects are submitted in reduced versions, evaluated and then applicants addressed by administrators of grant agencies to further develop their ideas. A lot of researchers' energy would be saved to work on other tasks. Fragmentation of funding of research has been also mentioned quite frequently.

4.1.2 Czech version

Na základě provedených rozhovorů a výsledků tematického workshop byla identifikována společensky významná témata týkající se oblastí projektu INSPIRATION. Zjištěná témata byla rozdělena do tří hlavních výzkumných otázek: a) Jak neohrožovat (jak chránit) produkční funkce půd pro budoucí generace v podmínkách, kdy jsou soudobé zemědělské a lesnické activity primárně orientovány na dosahování pouze krátkodobého profit (například dosahování zisku prostřednictvím dotací pro pěstování energetických plodin, které způsobují zvýšenou degradaci půdy erozí, pokles míry organické hmoty v půdách atd.)?; b) Jak dosáhnout optimální miry neproduktivního využívání země (například environmentální funkce, rekreační funkce, estetické funkce)?; c) Jak regulovat zastavování půdy a krajiny či jak zvýšit míru regenerovaných ploch brownfieldů (dříve využívaných ploch) a snížit zastavování volných ploch (greenfields)?

Jako nejvýznamnější výzkumné potřeby týkající se témat projektu INSPIRATION byly na základě provedených rozhovorů a výsledků workshop identifikovány tyto:

CZ-1: Divoké rozrůstání měst a související změny využívání krajiny v zázemí velkých měst

specifické výzkumné otázky

Lepší chápání a porozumění souvislostem zastavování volných ploch (greenfields);
Vývoj, testování a demonstrace nových technických řešení pro stavební activity na volných plochách, které respektují potřeby systému voda-půda-podloží (SSW);

Společenské náklady související se zástavbou volných ploch a identifikace příkladů dobré praxe a demonstrační projekty ze zemí Evropské unie i České republiky.

CZ-2: Kontaminované ploch jako dědictví 20. století a jak s nimi dále naložit

specifické výzkumné otázky

Potřeba výzkumu brownfieldů a vývoje holistických a transdisciplinárních přístupů, které zahrnují pohledy nejrůznějších aktérů; Lepší porozumění role veřejné správy při čistění kontaminovaných ploch; Zlepšení výzkumů zaměřených na příklady dobré praxe a demonstrační projekty zaměřené na kontaminované plochy a brownfieldy. Využívání inovativních řešení.

CZ-3: Propady zemědělské produkce v České republice a jejich souvislost s potravinovou bezpečností

specifické výzkumné otázky

Zemědělská produkce zaměřená na produkci potravin je významně vytlačována jinými aktivitami, jež se zaměřují na nepotravinářské využívání půdy (energetické plodiny), což významně ovlivňuje budoucí potravinovou (ne-)bezpečnost země; Chov hospodářských zvířat byl silně redukován, což je jedna z příčin nedostatků organické hmoty v půdách; Dochází ke zvyšování efektivity práce využíváním moderních prostředků, což způsobuje zvyšování intensity zhutňování půd a zhoršování propustnosti půd

CZ-4: Přizpůsobování se klimatické změně (extrémní klimatické jevy – sucha, povodně atd.)

specifické výzkumné otázky

Potřeba výzkumu, který by integroval produkční i environmentální stránky management půd; Lepší chápání a pochopení rolí veřejné správy; Zlepšování výzkumů zaměřených na příklady dobré praxe a demonstrační projektu související s řešením povodní a nebezpečím sucha

CZ-5: Zlepšování kvality systému půda-sedimenty-voda (SSW)

specifické výzkumné otázky

Lepší pochopení role veřejné správy ve zlepšování kvality systému půda-sedimenty-vody (SSW); Zlepšení výzkumů zaměřených na příklady dobré prace v kontextu SSW systému a podpora demonstračních projektů podporujících produkční i environmentální využívání krajiny

CZ-6: Regenerace městského prostoru a soudobá rizika dalšího rozvoje měst

specifické výzkumné otázky

Vztahy obyvatelstva k veřejnému prostoru ve města by měly být hlouběji zkoumány a pochopeny; Marketing měst a městských region, kterému by měla být věnována větší pozornost; Je nezbytné zaměřit se na alternativy vůči suburbanizaci a cílit k budování vice kompaktních měst (například využíváním již dříve využívaných, dnes ale opuštěných ploch)

CZ-7: Obnovitelné vs. fosilní zdroje energie v České republice

specifické výzkumné otázky

Podpora decentralizovaných energetických projektů na výrobu obnovitelné energie, kde je energie jednak lokálně produkována, ale i spotřebována; Energetické využívání odpadů z domácností; Prostorové rozmístění individuálních typů zařízení na výrobu obnovitelné energie a jejich přizpůsobení přírodním, sociálním a environmentálním podmínkám

CZ-8: Udržitelné využívání a obnova vztahu k půdě a krajině

specifické výzkumné otázky

Významné zlepšení a obnova vztahu obyvatelstva k půdě a krajině prostřednictvím vzdělávacích a výzkumných aktivit; Více pozornosti environmentálnímu vzdělávání na základních školách

Část studie zaměřená na vztahy vědy a politiky identifikovala tyto významné body – I) problémy s identifikací, formulací výzkumných otázek tak, aby jejich bylo řešení co možná nejblížeji spojeno s dlouhodobými potřebami celé společnosti. Tento problem je způsoben nastavením soudobého uvažování o problémech, které je dáno spíše krátkodobými cíli a silně podléhá politickým rozhodováním. Jsou očekávány výsledky výzkumů v krátkodobém horizontu, což je v kontradikci s dlouhodobými výzkumnými strategiemi České republiky. II) další problém je spatřován v omezené viditelnosti výsledků výzkumů. Je obvyklé, že vyvinuté metodiky jsou často certifikovány, nicméně v reálném životě nikdy nevyužívány. Jasnější komunikace výsledků výzkumu směrem k veřejnosti, ale i k veřejné správě, by byla velmi vhodným krokem. Bylo by take vhodné podporovat tzv. pilotní projekty, které verifikují a dale rozvíjejí výsledky výzkumů s tím, že tlak na okamžitou nezbytnosti na generování zisku je omezen.

Část studie zaměřená na možnosti podpory výzkumu přinesla tyto poznatky. Jak častý problem výzkumu v České republice je uváděn nedostatek finančních zdrojů. V souvislosti s historickým vývoje se česká výzkumná Krajina rozvíjí v několika klastrech, které občas mívají vzájemně si konkurující tendence (university, Akademie věd). Tato diskrepance výzkumný sektor jako celek oslabuje. Časté problémy byly zmiňovány v souvislosti s administrativní zátěží při řešení projektů. Tato by měla být redukována. Tento názor byl relativně častý, nicméně objevil se zejména u spíše menších výzkumných institucí a univerzit, kde je budování infrastruktury pro management projektů teprve v začátcích. Bylo by take žádoucí, kdyby mohly být výzkumné projekty podávány pouze v redukovaných verzích a dopracovávány teprve po kladném zhodnocení a výzvě oponenta. Tímto způsobem by s ohledem na velmi nízkou šanci výzkumých projektů na přijetí bylo ušetřeno mnoho práce a energie, které by mohla být směřována vhodnějším způsobem.

4.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for the Czech Republic. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation” and INSPIRATION D2.4 Report. In the Czech Republic, 20 NKS were interviewed and NKS workshop was organized. Details on these NKS are provided in Annex I. The desk study was based on documents as suggested by NKS. These are listed in Annex II.

Methodological approach of this survey is primarily based on the procedure agreed during the INSPIRATION workshop, which was organized in Vienna during June 2015. As the first step, desk study on topics of INSPIRATION has been carried out. Documents of the Ministry of Agriculture, the Ministry of Environment, the Ministry of Trade and Industry and relevant results of previous studies were mainly taken into account. Next part of research consisted of evaluation of 20 interviews with National Key Stakeholders (NKS), which took part July through November 2015. Individual persons to be interviewed were selected i) on basis of their recent professional activities, ii) on basis of expected structure of interviewed persons identified during INSPIRATION workshop as for their position in the INSPIRATION scheme (knowledge providers – end users – funders), as for type of their affiliation (national, regional, local authority – university and research institutions – SME, consultants – business and industry – NGO – etc.), and as for their professional interests (soil – sediment – water – land use management). Gathering of contacts for potential respondents of the research enabled both personal contacts and usage of snow ball method (recommendations of individual interviewees). Within the third step NKS workshop was organized, where interviewed persons were also invited. Workshop took place in the conference room of the Institute of Geonics, Academy of Sciences of the Czech Republic (October 22, 2015). Altogether circa 60 persons (61 participants) took part in workshop, where one day was spent in work in individual sessions (strategic research agenda, science-policy interface and possibilities for funding). Whole agenda of the INSPIRATION has been discussed, un-clarities detected during interviews were clarified. Together with panel discussions short questionnaire was also distributed to get more clear (and statistically assessable) results (42 reasonably fulfilled questionnaires were gathered and evaluated – see above).

Structure of participants of the NKS workshop in the Czech Republic illustrates table 1. It has to be stressed that organizers of NKS workshop put their big effort to gather majority of relevant stakeholders to one place in one time to have mutual discussions on the INSPIRATION topics. In not all cases were organizers successful since not all NKS were open to share their ideas and discuss their opinions more deeply. Nevertheless, we believe that final study was prepared and all major topics and included. Programme of the NKS workshop respected sub-divisions of the INSPIRATION topics and can be found as Annex Ic of this study.

Draft version of this Deliverable 2.5 was reviewed by selected NKS, who were able to invest their time and effort. Explicitly, part focused on societal challenges was reviewed by Assoc. Prof. Zdeněk Szczyrba of Palacky University in Olomouc, part focused on research topics by Assoc. Prof. Barbara Vojvodíková of Technical University of Ostrava, part on science-policy interface by Mr. Jan Hladík of Regional Development Agency of the South

Moravia and part devoted to funding options by Assoc. Prof. Josef Kunc and Dr. Robert Osman, experts on research funding options from academia and NGO sector.

Table 1: Numbers of participants of the NKS workshop in the Czech Republic according to their affiliantion and expertise

Funders – 22	National, regional, local authorities – 21	Soil – 12
End user – 25	Universities, research institutes – 23	Sediment - 15
Knowledge providers - 28	SME, consultants - 15	Water – 18
	Business, Industry – 5	Land Use Management - 22
	NGO – 7	
	Network - 1	

4.3 Research and Innovation (R&I) needs

4.3.1 Societal challenges and needs

There are many issues, which have shown during interviews as important challenges for society. These can be divided into three main core research questions:

a) How not to threaten (how to save) production functions of soils for future in conditions, when current agricultural and forestry activities are primarily oriented on achieving only short-term profits (e.g. generation of profit by means of subsidies for planting energy crops, which causes increased degradation of soils by erosion, decrease of organic materials in soils etc.)?

b) How to achieve the optimal non-productive functions (for example environmental functions, recreational functions, esthetical functions)?

c) How to regulate the consumption of soils and landscape for building activities or how to increase re-development on brownfields (previously developed lands) and decrease development on greenfields?

From long-term perspective, the above-mentioned issues are interconnected because for example ignorance of environmental functions (e.g. retention ability of soil and landscape – the ability to save water in cases of both floods and drought) can bring profits from short-term period but it can cause economic losses from long-term period view. Many stakeholders during interview emphasized that the problem is that society is oriented to short-term goals (objectives, profits) and does not care much about long-term goals. It can be exampled on issue of brownfields redevelopment, where during one interview typical statement, which illustrates attitude of majority of society to resources, was mentioned: “In our region the brownfields redevelopment has no support from politicians and voters, because there is high unemployed rate. Therefore there is support for development on greenfields because nobody does want to discourage the potential investors bringing job opportunities. Re-development on brownfields usually takes longer time than one election period and voters usually expect results within this one election period and politicians try to satisfy their expectations”.

From thematic perspective, the stakeholders during interviews usually preferred issues that are related to their activities and more all-embracing perspective was missing quite frequently. For example if the focus was given to the water erosion, the issue was naturally emphasized during interview. On the other hand, plenty of interconnections to other topics of SSW system were not commented. This might be caused by separation of individual research disciplines and lack of mutual communication with researchers, who are focusing on given topic from different perspective (from the point of view of other discipline). During many interviews it was mentioned that it is societal challenges are changing dynamically and are influenced by actual situation and experiences. If the year is influenced by floods (or if the floods damaged Prague as capital city during floods 2002), the discussion is focused on floods preventions. In 2015, the Czech Republic was influenced by drought and the issue was also discussed among different groups of stakeholders. Czech government replied to risks of extreme climatic events by the Strategy of the adaptation to the climate changes in the condition of the Czech Republic (October 2015).

Generally, during interviews as the most urgent environmental issue in the Czech Republic threats linked to coverage of open landscape were referenced. This is undoubtedly caused by dynamics of land-use changes, which has been taking place in proximity of large cities (due to suburbanisation processes) in last two decades. Unregulated growth of large cities at the expenses of open landscape is caused by changing opinion of public how modern housing should look like (big house with garden in the countryside), by attractiveness and availability of greenfields for investors for location of new industries, logistic and shopping centres. Gradual de-concentration of urban settlement systems drain urban population out of inner cities, which makes this part of cities less attractive. Lack of regulation concerning reduction of urban sprawl and coverage of open landscape (greenfields) in fact causes shortage of interest in regeneration of brownfields, which are occurring due to recent post-industrial tendencies in economy and society.

As has been summarized by the Search Study of Brownfields in the Czech Republic in 2007, around 2 400 of brownfield sites larger than 1 hectare existed within country eight years ago. The National Brownfields Regeneration Strategy estimated number of brownfields between 8,5-11,7 thousands on the areas of 27-38 thousands of hectares. These sites occur in the Czech Republic due to i) transition of the country from centrally planned economy to market economy in 1990s; ii) post-industrial tendencies in European economy, which depend more on sector of services (however Czech economy is still crucially dependent on industry). Existence of such amount of brownfields is perceived as important environmental issue, since plenty of such sites is located in not so attractive locations for potential investors (in the countryside). Plenty of new developments are built of greenfields. Some stronger brownfields regeneration policies and more significant support applied on efforts on regeneration on the regional and local level could help to given priority to regeneration of brownfields (instead of greenfields).

Since plenty of brownfield sites are contaminated, topic of soil and water contaminations was also shown between the most important environmental topics. A lot of effort and money has been recently invested to solve this destiny of communist regime, however plenty of sites still stay contaminated, which makes their re-use quite difficult. Development of new innovative technologies for cleaning of the sites, included alternative ways of cleaning, should be more supported to enable effective cleaning of contaminated sites.

Another environmental issue, which rises big attention in the Czech Republic, are environmental consequences of significant reduction of agriculture in the last two decades. With increasing of imports of food to the country local agricultural loses its inner markets and is reduced. Nowadays, agricultural sector gives job to just 100 thousand people; two decades ago it was almost five times more. For example more than half of pig heads disappeared from Czech agricultural in the last decade. Thus, function of agriculture as food producer has been significantly under pressure of its other functions (farming as renewable energy producer, provider of rural tourism, maintainer of landscape etc.). These non-food functions of agricultural are perceived as important (moreover if they were underestimated during communist era), but reduction of agricultural is perceived as risk for future development of the country (in the sense of food security). Period after 2004, when the Common Agricultural Policy (CAP) started to be applied in the Czech Republic, is typical by reduction of extent of agriculture in the Czech Republic and increase of its other than production functions. This is perceived by respondents of interviews as problematic due to

consequent reduction of organic matters in soil (reduction of animal husbandry) or increasing danger of soil sealing (usage of heavy machinery in agriculture). Support for farmers as food producers is perceived as inadequate and thus they are not able to compete with cheap food imports. Organic farming (circa 12 % of agricultural land and more than 4 thousands farms in the Czech Republic) is perceived as very positive phenomenon mainly in mountain and protected areas.

No so strongly, but still as an important topic relation of population to soil and landscape was usually mentioned. In context of nationalisation of land and properties in 1950s during Soviet style collectivisation in agriculture, majority of rural population stopped to be owned of the land and started to be employees within stated owned farm and agricultural cooperatives. After fall of the Iron Curtain (late 1980s), when agricultural land and linked properties returned back to private hands of local population, close relation of population to soil has been reduced to perception of land as solely factor/source for food production, whose amount is huge and there is no need for systematic protection. Perception of soils generally haven´t changed so much in period after the return of free society.

Topic, which rises huge discussions between experts, was water scarcity, droughts and generally extreme climatic events as possible consequences of climate change. A lot of research has to be conducted within this topic. The Czech Republic is located in central parts of Europe, where important European rivers spring and generally majority of water is leaving area of country quite quickly. There is need to hold water in set of new built artificial lakes, which are planned in the Czech Republic as response to danger of droughts, to introduce measures for saving water, to improve quality of surface water and to protect sources of ground water better. Plans for building of new artificial lakes are perceived by researchers and NGO people as technocratic answer of government to danger of droughts. They propose to support more weak solution of this problem by means support of water retention in landscape (restoration of wetlands, application of proper agricultural techniques, constructions of dry polders, reduction of water contamination, renewal of natural watercourses, support for natural infiltration of water from solid surfaces, renewal of historical ponds, suitable vegetation around watercourses, small-scale reservoirs, limitations for industry in use of fresh and underground water etc.).

Table 2: Importance of selected topics of INSPIRATION as evaluated by participants of NKS workshop in the Czech Republic (2015)

	Coverage of open landscape	Threat of soils by water erosion	Threat of soils by wind erosion	Soil and water contaminations	Soils sealing	Shortage of absorption capacity of soils	Shortage of organic matter in soils	Inappropriate crop rotation	Food (in-)security	Relation of population to soil
Average evaluation by all experts	1,26	2,55	3,05	2,0	3,17	1,98	2,81	2,67	2,26	2,95
Average evaluation by experts with experience < 7 years	1,25	2,68	3,11	1,79	3,29	2,25	2,79	2,79	2,18	3,04
Average evaluation of experts with experience 7 < years	1,29	2,29	2,93	2,43	2,93	1,43	2,86	2,43	2,43	2,79
Average evaluation by experts from public administration	1,57	2,43	2,93	1,79	3,07	2,07	2,79	2,71	1,79	3,00
Average evaluation by experts from research/academia	1,13	2,88	3,38	2,25	3,50	2,13	3,13	2,75	2,63	3,38
Average evaluation by experts from business/industry	1,10	2,50	3,00	2,05	3,10	1,85	2,70	2,60	2,45	2,75
Average evaluation by experts dealing with regional planning/management	1,24	2,48	2,90	1,97	3,10	1,86	2,83	2,59	2,10	2,93
Average evaluation by experts dealing with soil-sediment-water (SSW) systems	1,31	2,69	3,38	2,08	3,31	2,23	2,77	2,85	2,62	3,00

Source: survey conducted within NKS workshop, October 22, 2015, Ostrava; n=42

Note: Each respondent was asked to evaluate importance of topics by points (1=high importance, 5=low importance)

Table 2 shows preliminary results from NKS workshop in the Czech Republic (Ostrava, October 2015), where participants (n=42) evaluated individual selected topics of the Inspiration as for their urgency being important societal challenge (1=high importance, 5=low importance). As for methodology it is necessary to state that participants were not representative sample of stakeholders for the Czech Republic, on the other hand, all important groups of stakeholders were present and these results might surely represent thinking of experts gathered for the NKS workshop. It showed that the highest urgency is seen in issue of coverage of open landscape, followed by problem of soil and water contamination and shortage of absorption capacity of soils. As visible in table 2, which also shows results recalculated according to length of experiences of experts, their professional and sectoral affiliation, indicated preferences as for Inspiration topics didn´t changed so much with several exceptions (relative stronger perception of issue of food (in-) security was found in case of experts from public administration; soil and water contamination and shortage of absorption capacity of soils are strongly perceived as urgent topic by experts with shorter experiences, i.e. younger people).

4.3.2 Topics / research needs to include in the SRA

Below listed topics / research needs were defined based on conducted interviews and verified during NKS workshop in Ostrava (October 2015).

CZ-1: Urban sprawl and consequent land-use changes in the hinterland of big cities

Development on greenfields has many legislative obstacles but in reality it is very fast. Report about state of environment Czech Republic from 2013 (2014, p. 101) for example mentioned, that number of built-up areas increased in period 2000-2013 by 3,5 % (28,7 thousands hectares. The development on greenfields is the most intensive in the hinterlands of large cities (effect of both residential and commercial suburbanisation), but it is often common even in shrinking regions, where is decline of population. These shrinking regions (many of them with structural problems) have usually policy, which is oriented according needs of potential investors, who usually prefer development on the new industrial zones located in proximity of highways or main traffic roads. From short-term economic perspective, it is development on greenfields logical, because construction of new buildings on greenfields is usually cheaper and faster than construction the same building on brownfields or previously develop lands, where is necessary to pay additional costs (e.g. demolitions of previous structures, decontamination). From long-term perspective, this kind of development brings negative consequences as losses of agricultural fields and losses of future agricultural production or decrease retention ability of landscape (danger of floods).

Specific research questions (following the conceptual model of INSPIRATION):

Land Management:

- Improving the process understanding – and improvement of sharing of that understanding – of the development on greenfields
  Why: The better we understand the functioning of the development on greenfields – and especially the role of decision-making processes – the more effective in spatial management nad role of public administration of this issue.

Demand:

- Developing/testing/demonstrating new technical solutions for building activities on greenfields respecting needs of SSW systems – for example permeable concrete or asphalts, development of system catching and using rain-water from building as supply water, green roofs, buildings with law energetic and water consumptions or passive houses
  Why: There are probably one of the most urgent challenges to address. If the development on greenfields is not possible to completely prohibited, how to do it in an intelligent way.

Net-impacts:

- Social costs and benefits of development on greenfields, identify the examples of “best practices” or demonstration project from other EU countries and from Czech Republic l
  Why: The demonstration projects provides the arguments to see that long-term solutions are possible.

CZ-2: Contaminated sites as heritage of the 20th century and how to deal with them

In the Czech Republic, there is quite high occurrence of both contaminated sites and brownfields (neglected, abandoned and underdeveloped sites, where contamination is possible). The problem is that this issue is influenced by policies of different ministries Ministry of Environment of the Czech Republic takes care about contaminated sites from environmental perspective, agency CzechInvest (under Ministry of Industry and Trade of the CZ) offers brownfields as investments opportunities and Ministry of regional development takes care about brownfields from perspective of regional and municipal development. Theoretically, these ministries should cooperate but in reality the cooperation is far, far from perfectly and it can be sometimes be perceived as competition. There were created databases of both contaminated sites and brownfields, but the number of redeveloped sites is still limited and issue is challenge for future decades.

Specific research questions (following the conceptual model of INSPIRATION):

Land Management:

- There is need of research of brownfields and development of holistic and transdisciplinary approaches including the perspective of different and stakeholders
  Why: The current situation is to heterogeneous and it has negative impacts on effectiveness of solutions.
- Improve research focused on best practises and demonstration projects related to both contaminated sites and brownfields. Use innovative solutions – for example developing of solar power plants on contaminated sites and brownfields (detail Klusáček et al., 2014)
  Why: The demonstration projects provides the arguments for stakeholders from private sectors (e.g. owners) and public sectors (e.g. mayors) that long-term solutions are effective.

Net-impacts:

- Improving the process understanding – especially improvement of understanding of roles of the different public administration
  Why: The better we understand the decision-making process related to the issue, the more effective and tailored recommendations it is possible to create.

Demand:

- Improve research focused on technical solutions – e.g. new types of deconstruction of material and recycling of materials from demolitions; new methods of decontamination

  Why: The technical solution can cause the process more effective and they can decrease differences between contaminated sites and brownfields on the one side and greenfields on the other side.

CZ-3: Recent agricultural decay in the Czech Republic and possible food (in-)security

Agriculture in the Czech Republic has been experiencing huge structural changes in the last two decades. Primarily production functions of farming have been gradually replenished by social, cultural and mainly environmental functions, which significantly contributed to improvement of environment in protected and sub-mountain areas. On the other hand, especially under the influence of Common Agricultural Policy food production has been importantly reduced and structure of farming has been significantly changed (in favour of non-food activities).

Specific research questions (following the conceptual model of INSPIRATION):

Land Management:

- Agricultural production for food is significantly crowded out by other non-food production (energy crops), which significantly influences future food (in-)security of the country.

  Why: We should know more explicitly, where, why and with which dynamics are these processes taking place and how farmers are adapting to these agricultural changes.

Natural Capital:

- Animal husbandry has been strongly reduced, which is one of the reason for lack of organic matter in soils.

  Why: How such decrease of organic matter could be replaced to ensure suitable quality of soils?

- There was increase of efficiency by means of new modern vehicles (tractors), which caused increase of intensity of soil sealing and decrease of permeability of soils.

  Why: The better we understand the functioning of problems related to the soil sealing, the more effective solutions it is possible to find.

CZ-4: Adoption of landscape to climate changes (extreme climatic events – droughts, floods etc.)

The retention capacity of landscape is decreasing, because of type of agriculture and forestry oriented on short-term profits (e.g. decrease of organic material in agricultural and forestry soils, mechanic compaction of agricultural soils, decrease of soil quality and permeability ability by water and wind erosion) and because of type of short-term development projects on greenfields. The Ministry of Agriculture of the CR supports research oriented on improvement of production function, while Ministry of Environment takes care about environmental functions. Naturally droughts and floods could be important both from productive and environmental perspective. Therefore the Czech government decided to prepare the Strategy for drought, which should be finished by end of 2016. There is problems of fragmentation of research – for example some research are focused on positive aspects of calcification of soils but the other experts mentions that these by massive calcification decrease share of organic materials in soils and increase the problems with drought.

Specific research questions (following the conceptual model of INSPIRATION):

Land Management:

- There is need of research integrating productive and environmental perspective of soil management
  Why: The current situation is too heterogeneous and it has negative impacts on effectiveness of solutions.

Net Impacts:

- Improving the process understanding – especially improvement of understanding of roles of the different bodies of public administration (The ministry of Agriculture on the one side and ministry of Environment on the other side)
  Why: The better we understand the decision-making process related to the issue, the more effective and tailored solutions it is possible to identify.

Natural Capital:

- Improve research focused on best practises and demonstration projects related to both floods and droughts - for example restored wetlands small ponds,
  Why: The demonstration projects provides the arguments for different types stakeholders that long-term solutions could be both effective and environmentally friendly.

Demand:

- Improve research focused on technical solutions – e.g. monitoring of amount of underground water, positives and negatives effects of new dams, monitoring of water consumption by water flowmeters and financial penalisation of end-users for overconsumption of water (e.g. using water for swimming pool)

  Why: The technical solutions can also decrease impacts of floods and droughts.

CZ-5: Improving quality of soil-sediment-water (SSW) system

Improving quality of soil-sediment-water (SSW) system requires the holistic approach and collaboration of the different groups of stakeholders. There is problem that there is necessary the long-term cooperation. During one of the interview, one of expert on forestry lands mentioned – the changes in forest requires many years (for example replacement of monocultures forest, which are not very optimal from perspective of drought and floods) but majority politicians and voters expect fast and simply solutions – people wants to achieve their goals very fast and therefore they cause economic and environmental debts, which will be paid by next generations. Naturally this statement is rather sceptical and there are some solutions focused on improvement of soil-sediment water system as for example creations of new wetlands, small ponds, bio-centres and bio-corridors or windbreaks. There is also effort to change the agricultural and forestry production to avoid destroying the SSW system and to achieve the effectiveness – for example PREFarm system.

Specific research questions (following the conceptual model of INSPIRATION):

Land Management:

- Improving the process understanding – especially improvement of understanding of roles of the different bodies of public administration in SSW system
  Why: The better we understand the decision-making process related to the issue, the more effective and tailored recommendations it is possible to create.

Natural Capital:

- Improve research focused on best practises and demonstration projects supporting both productive and environmental function of landscape as restoration of wetlands, ponds etc.

  Why: The demonstration projects provides the arguments for stakeholders from private sectors (e.g. owners) and public sectors (e.g. mayors) that long-term solutions are effective.

Demand:

- Improve research focused on technical solutions – e.g. new types of management of SSW system using information from monitoring of problems by remote sensing

  Why: The technical solution can improve situation both from productive and environmental perspective.

CZ-6: Regeneration of urban space and current urban spatial risks

Contemporary cities are facing dynamic changes not only as for their widening to open landscape (see above), but also as for processes, which are occurring within their inner structures (e.g. gentrification, ghettoization, re-urbanisation etc.). While during communism one of effects of feigned egalitarianism was housing in housing estates of majority of population groups, after introduction of market economy in early 1990s inequalities are increasing. This tendency is in urban space expressed by suburbanisation, displacement and increased segregation of poor population within contemporary cities. As specific example shrinking cities might be mentioned as cities, which are significantly losing their population and are also decreasing as for their economy (e.g. cities in industrial regions, mining cities etc.). Pressure of investors causes decreasing of public space in favour of individual private ownership.

Specific research questions (following the conceptual model of INSPIRATION):

Net Impacts:

- Relations of population to public spaces in cities need to be more researched to learn more

  Why: How to work with public spaces in times when individualism is one of leading motivations of urban people?

Demand:

- Marketing of cities/urban regions is the topic, which needs more attention. This is mainly case of rather smaller cities.

  Why: Cities need to communicate their attractiveness to potential tourists, but also problems to be solved to local population. Such communication flow, which enables participation of local population in public matters, is still quite underestimated.

Land Management:

- Alternative to the suburbanisation could be concept of the compact city, which can be achieved by several methods – by increase of average high of buildings (cities should grow up) or by new building development on the previously develop lands.

  Why: The research activities focused on experiences with concept of compact city in the Czech Republic are missing.

CZ-7: Renewable energy vs. fossil fuels in the Czech Republic

Energy sector of the Czech Republic is strongly dependent on fossil fuels and nuclear energy. Recent support for renewable energies, which has been heavily supported by governmental money, caused many controversies and unintended environmental consequences (e.g. coverage of agricultural land by solar panels, huge planting of energy crops by farmers etc.). Due to many scandals renewable energy have a bad reputation between public instead of their environmental benefits.

Specific research questions (following the conceptual model of INSPIRATION):

Net Impacts:

- Decentralized projects for generation of renewable energy, where energy is locally both produced and consumed should be supported.

  Why: How such support could be done and simultaneously negative environmental consequences could be avoided?

Demand:

- Energy use of households and municipal wastes. Enormous energy potential of waste is nowadays overlooked.

  Why: Support energy use of wastes and by means of suitable spatial targeting make this use as much as effective.

Natural Capital:

- Spatial distribution of individual types of renewable energies should be more researched and adopted to natural/social/environmental conditions to make whole system more effective as for amount of generated renewable energy and reasonable impact on its hinterland.

  Why: How and to which extent current distribution of facilities for generation of renewable energies and consequent use of natural resource contribute to sustainability?

CZ-8: Sustainable use and renewal of population´s relation to soil and landscape

On the territory of the Czech Republic, the previous development caused that there is only weak relation between inhabitants and landscape (and soils), which they use every day. In other words, the majority of inhabitants do not care about their landscape if their interests are not threatened. The industrialisation process started already two centuries ago and the intensively industrialised country preferred needs of industries (e.g. mining of raw materials) compared to needs of agriculture. Moreover, the relation between inhabitants and their landscape was negatively influenced by complicated history during the 20th century. After the end of WWII, the German population (about 3 millions of inhabitants) in border regions of Czech lands was replaced by new population from inner parts of country, but the new inhabitants could not develop their relation to the landscape more significantly due to rule of communist regime between years 1948-1989. After 1948, there was process of nationalisation and collectivisation of agricultural production, which destroyed traditional farmers' families even in regions inhabited by Czech population. The process of nationalisation and collectivisation was extremely strong in comparison for example to the Poland, where system of small farms survived. In the period after 1989, the country focused on development of new industries (new industrial zones) and agriculture production is under control of large companies, which are oriented on short-term profit. The role of family farmers is only marginal. The result is that there is only a weak relation between inhabitants and their landscape and soils.

Specific research questions (following the conceptual model of INSPIRATION):

Net Impacts:

- Relation of population to soil and landscape shall be renewed and significantly improved. This could be achieved by set of wisely implemented educational and research actions.

  Why: How to improve relation of population to soil and landscape to avoid further press on landscape?

- More attention should be devoted to environmental education in primary schools. Interactive and smart environmental games could be attractive way how to make environmental education more attractive for school kids.

  Why: Young generation should be educated more pro-actively to ensure more sustainable way of use of soils and landscape in future.

4.4 Experiences regarding connecting science to policy/practice

4.4.1 Use of knowledge

In the Czech Republic, there is classical differentiation between basic and applied research. Basic research is evaluated according to number of articles and quotation in the prestigious per-review journals with impact factors. The applied research creates scientific products, which are tailored according needs of stakeholders from non-scientific sectors. During interviews with stakeholders from non-scientific sectors, it was emphasized that the useful scientific knowledge is some in praxis applicable information published preferably in Czech language. Language barrier causes significant problems while adopting ideas published in English. Respondents of interview typically use information from internet pages of the special research institutes (e.g. Research Institute for Soil and water Conservation - see http://www.vumop.cz/ or T. G. Masaryk Water Research Institute – see http://www.vuv.cz/), from internet pages focused on concrete issues (the portal Our Water – see http://www.nase-voda.cz/), from special maps (e.g. internet maps dealing with erosion of agricultural land – see http://me.vumop.cz/mapserv/monitor/), from special brochures (e.g. Brochure of protection against water erosion – see http://geoportal.vumop.cz/download/MZE_prirucka_vodni_eroze_2014.pdf), from National Strategies (e.g. Strategy of the adaptation to the climate changes in the condition of the Czech Republic, 2015).

One of the typical result of applied research are so called certificated methodologies, where the end-users participated at formulating of research question and on research activities, testing and on the following practical implementation of these methodologies. The problem of the system is that many of these methodologies are created by research institute and then certified by ministry, which is founder of this institute. In these cases there is clash of interests, because the certification process is not very strict and ministries find it as opportunity to find financial sources for their own institutes. Plenty of usable results of applied research don´t reach their potential users due to lack of interconnections between governmentally funded research and people in decision making positions (no matter if from public or private sphere). Big potential is seen in support for cooperation of joint research of researchers and end users from different sectors. As very good attempt in this direction activities of the Technological Agency of the Czech Republic are perceived, which has been founded couple years ago (2009) to support applied research. On contrary, it is hard expect that transfer of knowledge from research to industry goes in similar paths in case of different scientific disciplines. Application of results of social sciences researches were frequently mentioned as very specific, which success/failure in praxis is quite difficult for evaluation (on contrary to application of patents, softwares, new products etc.).

4.4.2 Possibilities to set the agenda

Some topics are influenced by previous development – for example the collectivisation of agricultural activities in period 1948 – 1989 created in former Czechoslovakia large agricultural fields, which are threatened by water and wind soil erosion more than for example relatively smaller agricultural fields in Austria or in Poland. Some issues are related to the Common Agricultural Policy of EU. There are joint European issues, which are especially related to effects of global climate change on landscape – the most important are drought and floods. The scientific research policies are influenced interests public administration. After floods in 2002 (when Prague was heavily damaged), there was support for research projects dealing with floods protection. After flash floods in Jeseník nad Odrou in 2009, there was supported research by Ministry of Interior focused on warning against this risk. After drought in 2015, there is attention given to the water sources for human activities (households, industrial, agricultural, recreation) etc. Cross-national experiences would be useful and transfer of knowledge (both cross sectoral and cross national) is desired.

4.4.3 Science – policy – practice

Respondents were in majority experienced in working on studies/surveys for needs of local/regional/national bodies of administration. Majority of experiences was quite sceptical concerning transfer of results of research to practice in sense of ignorance mainly on local administration level. It showed that respondents suppose that research conducted and funded by private money has much more better chances to be applied, since state support for research in ineffective. On the contrary, respondents based in public research institutes and universities were pointing to strong lobby of private companies to persons with decision making positions.

During many interview there was mentioned that new scientific methods and recommendation are public available on Internet (even in forms of dissemination brochures) but there is problem with implementation. The research activities related to the soil can be divided to two groups:

- Research activities which brings positive effects in short time perspective (and profit) – they usually do not have problems with implementation – for example projects for new fertilisers increasing of agricultural production or project using remote technologies to decrease consumption of fertilisers,
- Research activities which brings positive effects in long-term perspective – for example creation of wetland improving of situation of underground water in long-term perspective – this is not very attractive both for stakeholders from private sector (if there are no or small subsidies) and from public sectors (they think in one or two election periods and do not care what could happen in 20 or 25 years)

Contemporary research to be applied for societal needs was sometimes perceived as just formal way how to transfer money from state budget to budgets of research institutes. In reality, few results were applied in praxis (as good examples of projects with societal impact were COBRAMAN or CircUse were mentioned; the first project which supported education of brownfields managers for administration, the second one as example of suitable application of analytical framework developed by scientists). Between beneficial projects, which helped, project with title Partnership for Czech Brownfields (http://fast10.vsb.cz/brownfield/en/) was also frequently mentioned. This project enabled regular meetings of experts on issue of brownfields, which significantly contributed to transfer of knowledge about benefits of brownfields regeneration in cities.

Respondents mentioned very frequently that problem with identification and formulation of research questions, which solution might be beneficial for whole society, is caused by short-term thinking of decision makers, who strongly rely on political decisions. If horizon of planning for decision makers is reduced just for four years (which is election period), quick results are expected. Such approach was evaluated as short-sighted due to needs of long-term strategy for research in the Czech Republic.

Another problem has been seen in limited visibility of results of research. It is quite usual that methodologies are developed and certified, but never used in reality. Some more clear communication of research results to public and administration bodies would be useful. It would be also useful to support so called pilot project, which could verify and more develop result of previous research without pressure to earn immediately money.

4.5 National and transnational funding schemes

4.5.1 Funding schemes and possibilities for research funding

As very frequent problem of research in the Czech Republic lack of financial sources in this sector was mentioned. Due to historical reasons research in the Czech Republic is developed in several clusters with sometimes mutual competing tendencies (universities, academy of sciences), which harms whole research sector. Nowadays chance for individual project to be supported is very low, which operates as demotivating factor for researchers. If share of supported projects (on total number of applications) is below 30 %, it is not about competition, but more about some kind of lottery.

Administration burden connected to projects is enormous and should be reduced. This opinion was quite frequent, on the other hand, it was obvious, that this complain rises from situation at rather smaller research institutes and universities, where building of special department, which is primarily specialized on administration support for projects, is usually at beginnings.

It might be also beneficial, if projects are submitted in reduced versions, evaluated and then applicants addressed by administrators of grant agencies to further develop their ideas. A lot of researchers' energy would be saved to work on other tasks. This is caused by above mentioned quite low share of finally supported projects.

Fragmentation of funding of research has been also mentioned. Within the Czech Republic plenty of governmental funding agencies exist (e.g. within individual ministries), which makes funding system quite chaotic and confusing. As the result of reduction of funding for research plans of individual institutes, pressure on researchers to apply for external funding has been increased. Generally, funding of research in the Czech Republic has been gradually adopted to competitive environment, which is quite new situation incomparable to support for funding decade ago (share of external money from grant projects makes almost half of budgets of individual research institutes).

As great possibility inflow of money (after EU accession) from structural funds for support of research infrastructure was mentioned. On the other hand, not all projects were reasonably planned and money wasted (mainly in "soft" projects, which supported development of human resources in research). It would be better to support "hard" research activities by more money.

Money from private companies are crucially lacking in Czech research sphere. Problem with co-funding (quite small institutes are not able co-fund research projects – typically LIFE+ Programme, where co-funding is almost 60 %). As problem seems to be huge administration of projects, especially if coordinated. Huge administration burden thus causes lack of H2020 and FP7 projects coordinated from the Czech Republic.

As problematic is seen evaluation system of research results in the Czech Republic. Evaluation methodology is insufficient and doesn´t take specifics of various research disciplines into account. Results of research, which find their use in praxis, should be more seriously taken into account. This fact causes disconnections between research and society. The Czech Republic is very small country, where research sector is quite small and people know each other very well. This might be beneficial for cooperation, but sometimes it works

as research lock-in. Some fresh air from abroad would be more than useful. Cross-national cooperation on research project could help to make research on SSW system better.

Evaluation of grant projects is very long (usually more than 6 months), should be more quick and flexible. Social sciences are usually underestimated as for their relevance. Technocratic approach of officials is prevailing. The most usual way how to learn more about results of research are visits at conferences, fairs, reading of professional journals and contact with universities.

Generally as the main problems of financial system can be mention the following:

- Closeness of research, monopolisation of research and lobbying power of the experienced teams - the experienced research teams achieved the majority of grants and there is not o lot of space for young research teams with innovative ideas – this closeness of scientific knowledge is visible at all hierarchical levels (regional, national, EU)
- Support of the same research activities from the different sources – it is common especially if the issue is solved by two or three Ministries, because each ministry tend to support their own research institute,
- Short-term orientation of research – the government decrease support for long-term research and researchers have to make changes of their research activities based on 2 or 3 years grants,
- Support of researchers according issues in media – if there is floods, the research on floods is supported, if there is drought, the research on drought is supported etc.

Table 3: Selected funding options collated for the Czech Republic on the national level (more options could be found in Annex 1d)(source: own research)

Research and Innovation funder	What and/or whom do they fund?	More info
Technology Agency of the Czech Republic	applied research projects	www.tacr.cz
Grant Agency of the Czech Republic	primary research projects	www.gacr.cz
National Agency for Agricultural Research	applied research projects	www.nazv.cz
Ministry for Regional Development of the Czech Republic	applied research projects	www.mmr.cz
Ministry of Interior of the Czech Republic	applied research projects	www.mvcr.cz
Ministy of Environment of the Czech Republic	applied research projects	www.mzp.cz
Ministry of Cultural of the Czech Republic	applied research projects	www.mkcz.cz
Operational Programme Research, Development and Education (2014-2020)	support for infrastructure of research	www.opvvv.cz
CEZ foundation	applied research projects	http://www.nadacecez.cz/cs/uvod.html
Ministry of Trade and Industry of the Czech Republic	applied research projects	http://www.mpo.cz/dokument160144.html
Czech Academy of Sciences	basic research projects	http://av21.avcr.cz/

Table 4: Selected Funding options collated for the Czech Republic on the regional level (more options could be found in Annex 1d)(source: own research)

Research and Innovation funder	What and/or whom do they fund?	More info
Support of regional authorities	applied research projects	For example http://www.msk.cz/cz/uredni_deska/podpora-vedy-a-vyzkumu-v-moravskoslezskem-kraji-2015-53798/
Support of big cities	applied research projects	For example http://www.brno.cz/sprava-mesta/dokumenty-mesta/koncepcni-dokumenty/
Internal programs of universities	basic research projects	For example http://www.vse.cz/veda/interni_grantova_agent.php

Applied research in the Czech Republic is funded by multiple sources on different levels – primarily were mentioned these sources (see table 3, table 4):

a) cross-national level – Horizon2020, Norway funds, Interreg IVc, ESPON programme, Central European Initiative

b) national level – Technology Agency of the Czech Republic, National Agency for Agricultural Research (Ministry of Agriculture), Applied Research for National and Cultural Identity (Ministry of Culture), Safety Research Programme (Ministry of Interior), Research for needs of regions (Ministry for Regional Development), Operational Programme Environment (Ministry of Environment)

c) regional level – grant schemes of regional administrations.

4.5.2 Gaps in financial resources for research

There is lack of support for integrative, holistic and multidisciplinary approaches. The SRA is object of study of many disciplines and each discipline tend to defend their position – it is questions of power. The Czech Republic is small country and scientists, who are often authors of grants proposals are the evaluators of other grant proposals. From perspective the applied research, the end-users emphasized the grants, which are prepared from beginning in cooperation with end-users. They perceived as very successful the programs of Technological agency of Czech Republic and they mention that the number of financial sources for good applied research should be increased.

4.6 Annexes

Annex Ia: NKS interviews in the Czech Republic

Date of interview	Organisation	Interview	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
20-07-15	Regional Development Agency of the South Moravia	Jan Hladík		/		/										/
28-07-15	Statutory city of Ostrava - Department of Environment	Aleš Brázda		/		/							/		/	
21-10-15	Mendel University	Aleš Bajer			/		/						/	/		
17-10-15	CzechInvest	Patrik Reichl	/					/								/
03-08-15	Center for urban and regional management	Ondřej Slach			/				/							/
01-09-15	Czech Environmental Partnership Foundation	Miroslav Kundrata		/						/				/		
27-08-15	Czech Partnership for Brownfields	Barbara Vojvodíková			/						/					/
15-08-15	VUKOZ Brno	Hana Skokanová			/		/								/	/
27-08-15	Center for Transport Research	Marek Havlíček			/			/						/	/	/
22-10-15	Regional Council of NUTS2 Moravia-Silesia	Vladimír Gelnar	/			/										/
22-10-15	SOV Tranovice	anonymized		/		/										/
26-10-15	Ministry for Regional Development	František Kubeš	/			/										/

21-09-15	CEZ (energy company)	Stanislav Cetkovský	/						/					/		/
13-11-15	GISIT	Radek Petrželka			/			/								/
22-10-15	TGM Water Research Institute	Igor Konvit			/				/						/	
27-10-15	Institute for Spatial Development	Igor Kyselka	/			/							/			/
29-10-15	Brno University of Technology	Miroslav Dumbrovský			/		/								/	
14-06-15	Liberecky Region	Petra Vrzáčová	/			/										/
22-10-15	State Land Office	František Pavlík		/		/							/	/		/
23-10-15	Director of agricultural cooperative	anonymized		/				/					/			/

Persons, who didn't´ wish to be referenced, were anonymized. Full contacts to these persons are at NFP for the Czech Republic.

Annex Ib: NKS questionnaire template

See Chapter1, Annex I for the introduction to the questionnaire and for the questionnaire in English language

Questionnaire template – in national language (Czech Republic)

Otázky pro rozhovory v členských zemích EU – upraveno pro ČR

Poznámka: tyto otázky byly vytvořeny jako vodítko pro výzkumníky, kteří provádí výzkum v různých členských zemích EU. To znamená, že některé otázky mohou být relevantní v jedné zemi EU a irelevantní v jiné členské zemi EU. Jedná se tedy o soubor podpůrných otázek sloužících k navození diskuze v rámci rozhovorů.

A. Základní údaje

Stát EU: Česká republika

Jméno dotazované osoby:

Instituce/ role:

Jakým způsobem má být ve vyhodnocení výsledků na osobu odkazováno:

Jméno výzkumníka projektu INSPIRATION:

Datum rozhovoru:

B. Úvod – představení projektu

Cílem projektu INSPIRATION, který je financován Evropskou komisí, je formulace **strategické výzkumné agendy** (strategic research agenda - SRA) **zaměřené na oblasti výzkumu využití země, jejich proměn včetně dalších částí systému tematických oblastí Půda – Sedimenty – Voda (Soil – Sediment – Water - SSW)**. Zmíněná agenda bude formulována s pomocí koncových uživatelů výzkumů tak, aby byly zohledněny současné i budoucí společenské výzvy a potřeby. Mezi cíle projektu také patří aktivity vyvíjející modely implementaci strategické výzkumné agendy a identifikace sítě veřejných a soukromých institucí, které se společně budou podílet na uvedení strategické výzkumné agendy do praxe.

Stěžejní aktivitou projektu je shromažďování relevantních informací od jednotlivých klíčových aktérů na národní úrovni, kteří jsou experty ve svém oboru a pomáhají při identifikaci stavu a úrovně výzkumů jednotlivých témat v České republice. Tyto informace slouží jako podklad pro budoucí Evropskou výzkumnou agendu.

C. Základní informace o sobě, se kterou byl rozhovor uskutečněn

1. Jaká je Vaše současná role v oblasti výzkumu zaměřeného na oblasti výzkumu využití země (Soil – Sediment – Water systems)?
   Jste (je možné zvolit více odpovědí):

   O orgán veřejné správy na národní, regionální, lokální úrovni

O univerzita/výzkumný ústav

O malý a střední podnik /konzultant

O obchod a průmysl

O nezisková organizace

O zástupce sítě subjektů

O v jiné pozici, uveďte konkrétně: ……..

2. Jak dlouho působíte v této roli / pozici?
Pracujete sám/ v týmu – jaká je jeho velikost?

3. Oblast Vaší specializace/ odbornosti (je možné zvolit více odpovědí):
O půda
O voda
O sedimenty
O městské plánování
O krajinné plánování
O územní management
O jiná - jaká: …..

4. Poskytuje vaše organizace financování výzkumu?

O Ano, prosím specifikujte *(jako správce programu, příležitostně, z veřejných zdrojů, ze soukromých zdrojů)*……..

O Ne

D. SVA = Strategická výzkumna agenda zaměřená na oblasti výzkumu využití země, jejich proměn včetně dalších částí systému tematických oblastí Půda – Sedimenty – Voda (Soil – Sediment – Water - SSW)

5. Vaše preference ohledně rozsahu Strategické výzkumné agendy?
[Myslete na časové rozpětí výzkumných potřeb, současný stav výzkumu, analýzu stakeholderů, témata typický pro ČR a témata pro více zemí EU, přehled národních agend, příležitosti financování výzkumu….

6. Vaše očekávání ohledně SVA?
[Na jaké strategické cíle by se měla zaměřit?]

7. Vaše preferovaná témata spojená s SVA?
[typ oblastí, význam – váha oblastí, společenské výzvy, potřeby, …]

8. Existující výzkumné agendy/programy
[Existují nějaké dostupné dokumenty či studie, které jsou spojené s SVA? Jaké konkrétně?

9. Je nějakým způsobem měřen dopad výzkumů v oblasti SVA v České republice? Pokud ne, tak proč ne? Pokud ano – jakým způsobem? Byly například vytvořeny nějaké hodnotící studie, které měří kvalitu výzkumu zaměřeného na SVA? Jsou tyto studie dostupné a kde?

10. Jaká je v současnosti národní agenda zaměřená na SVA?

11. Jaké témata jsou prioritní? Např.
    - *Potravinová bezpečnost a kvalita potravin;*
    - *Zajištění dostatečných zdrojů pitné vody;*
    - *Zajištění zdrojů energie a jejich distribuce;*
    - *Redukce spotřeby surovinových zdrojů,*
    - *Zajištění efektivního využití přírodních zdrojů;*
    - *Příspěvek k adaptaci na klimatické změny;*
    - *Příspěvek k zdravému životnímu prostředí;*
    - *Zajištění spolehlivé infrastruktury*

Pro všechna výše uvedená témata zodpovězte následující podrobnější otázky

12. Jaká je naléhavost/ dopad tématu?
    Jaké riziko hrozí, pokud nebude [tématu věnována pozornost?
13. Kdo bude zasažen?
14. Kdo je zodpovědný?
15. Je to téma, kterému se věnuje vaše organizace pouze národním tématem v rámci ČR nebo se jedná o téma důležité z hlediska více zemí EU? I
16. Jaká je největší výzkumná potřeba spojená s tématem?
    Jaký je momentální stav tohoto tématu a čeho by mělo být dosaženo v budoucnu (jak odhadujete časový horizont – kolik času zabere dosažení tohoto cíle)
17. Jakým způsobem budou nové poznatky využity v praxi?
18. Kdo financuje tento výzkum? Kdo by ho měl financovat?

E. Propojení vědy a politiky (praxe)

19. Jaké jsou vaše zkušenosti týkající se využití vědeckých poznatků při:
    - zlepšování příležitostí pro obchod a podnikání?
    - zvládání dalších sociálních výzev?
    - participaci na implementování politik a (nebo) jejich modifikacích?
    Co se daří dobře a jaké oblasti by bylo třeba zlepšit?
20. Jaké jsou zdroje (vědeckých) informací?

    Kde hledáte informace, které potřebujete? Používáte například Wise-RTD

http://www.wise-rtd.info/en ? Nebo jiné webové stránky?

21. Jakým způsobem jsou lidé ze sektoru mimo vědu (např. obchod, politika a další) zapojováni do formulace vědeckých výzkumných otázek?
    Co se v této oblasti daří a co by bylo dobré zlepšit?

22. Jakým způsobem jsou lidé ze sektoru mimo vědu (např. obchod, politika a další) zapojeni do využití vědeckých výsledků?
    Co se v této oblasti daří a co by bylo dobré zlepšit? *Spolupráce ve výzkumně inovačních konsorciích, participace na společném výzkumu atd.*

23. Můžete doporučit nějaké národní dokumenty zabývající se propojením vědy a politiky (praxe)?

F. Financování

24. S jakými zdroji financování tohoto výzkumu máte zkušenosti na úrovni:

    a) regionální?

    b) národní?

c) EU?
    např. *H2020, multilaterální jako například Joint Programming Initiatives - https://ec.europa.eu/research/era/joint-programming_en.html*

d) Světová? Např. *Belmont Forum - http://belmontforum.org/*

    U všech otázek zaměřených na dosahování politických cílů spojených se Strategickou výzkumnou agendou, nás zajímají detaily – odkazy na dokumenty nebo webové stránky.

25. Jaký způsob vědeckých výzkumů je nejefektivnější z hlediska přínosu pro praxi a z hlediska zhodnocení finančních prostředků vložených do výzkumu?

26. Nebo jinak řečeno – jakým způsobem získat z výzkumných projektů financovaných EU na národní, regionální a lokální úrovni) nebo soukromým sektorem maximum užitečných poznatků souvisejících s tématy Strategické výzkumné agendy?

27. Znáte příklady dobrých projektů nebo programů financujících projekty, které se týkají témat Strategické výzkumné agendy?

28. Jsou zde témata, která nejsou podporována současnými mechanismy financování? Která témata by potřebovala nové/jiné způsoby financování?

29. Integrované a komplexní přístupy (které jsou důležité z hlediska společenských výzev spojených s tématy Strategické výzkumné agendy) mají obvykle problém s financováním i s hodnocením vědeckou komunitou. Co je zapotřebí ke zlepšení v této oblasti?

30. Jakým způsobem by se měly nastavit vhodné možnosti financování tak, aby

    - společenské potřeby byly zajištěny?,

- poznatky dosažené v budoucnu díky implementaci Strategické výzkumné agendy byly využívány?,
- a zdroje financování byly efektivně využívány a měly multiplikační efekt pro praxi?

G. Ostatní (poznámky, návrhy, příklady):

H. Závěrečná část rozhovoru

Děkujeme za Váš čas a ochotu!

- Chtěli byste být informováni o výsledcích projektu INSPIRATION?
- Můžete navrhnout někoho jiného, kdo by mohl zajímat o projekt INSPIRATION, případně by mohl být vhodným člověkem pro rozhovor?
- Máte nějaké další otázky k projektu nebo k tomuto rozhovoru?

INSPIRATION acknowledges the received funding from the European Community's HORIZON2020 Framework Programme under grant agreement no 642372

Annex Ib: NKS hand-out: INSPIRATION interview at a glance

See Chapter1, Annex II

Annex Ic: Programme of the NKS workshop in the Czech Republic (October 22, 8:30-18:00), conference room of the Institute of Geonics of CAS in Ostrava

Programme:

8:30-9:00 – registration of participants
9:00 – official welcome speach
9:15-9:40 – introduction to the INSPIRATION project (Petr Klusáček)
9:40-10:15 – summary of present state of results based on interviews (Stanislav Martinát)
i) strategic research agenda (SRA)
ii) science-policy interface (SPI)
iii) funding options
10:15-10:30 **– coffee break**
10:30-12:00 – discussions (World Café) on individual topics (Petr Klusáček, Stanislav Martinát, Bohumil Frantál)
i) strategic research agenda (SRA)
ii) science-policy interface (SPI)
iii) funding options
12:00-12:20 – summary of discussions (Stanislav Martinát)

12:20-13:20 **– lunch break**

13:20-15:20 – work in paralel sections 1
i) strategic research agenda (SRA)
ii) science-policy interface (SPI)
iii) funding options
15:20-15:35 **– coffee break**
15:35-17:00 – work in paralel sections 2
i) strategic research agenda (SRA)
ii) science-policy interface (SPI)
iii) funding options
17:00-17:45 – summary and final discussion on results of workshop (Petr Klusáček)
17:45-18:00 – final conclusions

Annex Id: R&I funding options collated for the Czech Republic

R&I funding options collated for country: Czech Republic

	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
Regional				
1	Fund for rural development	Public body	Small projects for rural development, support for LEADER programme	https://www.szif.cz/cs/prv2014
2	Support for research and development in the Moravian-Silesian Region	Public body	Support for young researchers from region, attraction for foreign researchers, support for new technologies and services, cooperation with companies	http://www.msk.cz/cz/uredni_deska/podpora-vedy-a-vyzkumu-v-moravskoslezskem-kraji-2015-53798/
3	Fund for mobility of researchers	Public body	Support for mobility of young, talended scientist	http://www.econ.muni.cz/zamestnanci/zahranicni-mobility/mobility-akademickych-pracovniku/program-na-podporu-mobility-akademickych-pracovniku
National				
4	Technology Agency of the Czech Republic	Public body	funding for research projects with high applicability	www.tacr.cz
5	Grant Agency of the Czech Republic	Public body	primary research projects	www.gacr.cz
6	National Agency for Agricultural Research	Public body	applied research projects focused on new technologies in agriculture	www.nazv.cz
7	Ministry for Regional Development of the Czech Republic	Public body	applied research projects on regional policy and regional development	www.mmr.cz
8	Ministry of Interior of the Czech Republic	Public body	applied research projects with focus on security issues	www.mvcr.cz
9	Ministy of Environment of the Czech Republic	Public body	applied research projects, very limited amount of money – more focused on environmental studies	www.mzp.cz
10	Ministry of Cultural of the Czech Republic	Public body	applied research projects	www.mkcz.cz
11	Operational Programme Research, Development and Education (2014-2020)	Public body	support for infrastructure of research	www.opvvv.cz

12	CEZ foundation	Private body	small applied research projects	http://www.nadacecez.cz/cs/uvod.html
13	Ministry of Trade and Industry of the Czech Republic	Public body	applied research projects	http://www.mpo.cz/dokument160144.html
14	Czech Academy of Sciences	Public body	basic research projects	http://av21.avcr.cz/
15	CzechInvest	Public body	applied research projects, cooperation for business and public research institutes, support for transfer of technologies	http://www.czechinvest.org/podpora-vyzkumu-a-vyvoje
European/International				
16	Horizon 2020 (and before EU Framework Programmes).	EU and private investments	EU Research and Innovation programme (2014 to 2020). Open for consortia, with different parties on different topics (e.g. societal challenges)	https://ec.europa.eu/programmes/horizon2020/
17	JPI - Joint Programming Initiatives	Member States commit to Joint Programming Initiatives (JPIs)	open for consortia of the contributing member states	http://ec.europa.eu/research/era/joint-programming_en.html
18	Interreg	Financed by the European Regional Development Fund	helps regions of Europe share knowledge and transfer experience to improve regional policy	http://www.interreg4c.eu/
19	ERANET - European Research Area Network	instrument under Horizon 2020	instrument to support public-public partnerships in their preparation, establishment of networking structures, design, implementation and coordination of joint activities as well as topping up of single joint calls and of actions of a transnational nature	http://ec.europa.eu/research/era/era-net-in-horizon-2020_en.html
20	LIFE +	instrument under Horizon 2021	EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU	http://ec.europa.eu/environment/life/

21	European structural funds	EU	Structural Funds play a substantial role to help all regions build research and innovation capacities corresponding to their situation and priorities: Operational Programme Quality of the Environment, Research and Innovation, Education...	http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=structural_funds
22	COST - European Cooperation in Science and Technology	EU	European framework supporting trans-national cooperation among researchers, engineers and scholars across Europe.	http://www.cost.eu/
23	Norway Fund / EEA - Iceland, Liechtenstein, Norway Fund	Norway Grants / EEA Grants - Bilateral Fund at National Level aimed at the implementation of activities for strengthening of the bilateral relations between the Slovak Republic and the Donor States (Norway, Liechtenstein and Iceland).	Increasing competitiveness of green enterprises and green job creation. The Programme also focuses on adaptation to climate change issues, the protection of water retention capacity of soil, forest and meadows; restoring forest ecosystems, increased soil erosion protection and revitalising waterways; improving the definition of flood plains and areas at disk during flooding; and informing the public about flood prevention measures and preparedness.	http://eeagrants.org/Where-we-work/Slovakia
24	Future Earth	the International Council for Science (ICSU), the International Social Science Council (ISSC), the Belmont Forum of funding agencies, the Sustainable Development Solutions Network (SDSN), STS forum, the	international research platform providing the knowledge and support to accelerate our transformations to a sustainable world	http://www.futureearth.org/who-we-are

		United Nations Educational, Scientific, and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), the United Nations University (UNU), and the World Meteorological Organization.		
25	'Intergovernmental Platform on Biodiversity and Ecosystem Services' (IPBES)	United Nations	mechanism recognized by both the scientific and policy communities to synthesize, review, assess and critically evaluate relevant information and knowledge generated worldwide by governments, academia, scientific organizations, non-governmental organizations and indigenous communities.	http://www.ipbes.net/index.php/about-ipbes
26	Man and the Biosphere Programme (MAB)	UNESCO	develops the basis within the natural and social sciences for the rational and sustainable use and conservation of the resources of the biosphere and for the improvement of the overall relationship between people and their environment. It predicts the consequences of today's actions on tomorrow's world and thereby increases people's ability to efficiently manage natural resources for the well-being of both human populations and the environment.	http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/about-mab/

27	Visegrad Fund	Visegrad countries	short and long term grands supporting collaboration among Visegrad countries in the culture, research and other activities. The purpose of the fund is also to facilitate and promote the development of closer cooperation among citizens and institutions in the region as well as between the V4 region and other countries, especially in the Western Balkan and Eastern Partnership regions.	www.visegradfund.org

* Include full name and (if available) acronym of the R&I funding option

** Include name of the R&I funder/funding institute or authority

*** Detail which type of programme, projects, partners or infrastructures they are funding

*** Include weblink and/or other reference for more information on this R&I funding option

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5. Finland

Report by Antti Rehunen, Teija Haavisto, Ritva Britschgi, Outi Pyy, Jari Rintala, Petri Shemeikka

5.1 Executive summary

5.1.1 English version

This report describes the Finnish results of the NKS interviews, the desk exercise and national workshop carried out in INSPIRATION project. Altogether 14 interviews took place with 23 experts. Interviewed stakeholders represented quite equally funders (7 stakeholders), end users of knowledge (9 stakeholders), and knowledge producers (5 stakeholders). Workshop had 32 participants of which 4 were representaves of funders, 15 end users of research data and 13 knowledge providers.

As important societal challenges, most often mentioned by the NKS were reduction of raw material and resource consumption, resource efficiency and circular economy. Also climate change mitigation and adaptation to change were considered important issues in future research activities. Food and drinking water safety were regarded highly important, but risks related to them were thought to be only moderate at the national level, but critical globally. Healthy living environment was seen as a general goal of urban development requiring sufficient data and methods for integrated planning. Research needs related to biodiversity, green infrastructure and ecosystem services were also mentioned particularly in connection with fitting different land uses with each other. Security of infrastructure and energy distribution was considered as a less stressed issue from land use, soil and land management perspective, but the impacts of infrastructure development and energy production were mentioned as essential theme.

Research and innovation needs were summarized under 16 research topics and grouped in six thematic areas. Under each research topic, 4-8 most essential research questions were formulated.

Under the theme of data gathering, analysis and assessment methods, need for impact assessment of different land uses and climate change on quality and quantity of surface waters and groundwaters was stressed. Development of new sampling and analysis methods to improve monitoring cost efficiency and measurement reliability in low concentrations was also considered important. The gathering, use and synthesizing of data on the state of soil and waters from multiple sources and research fields was seen essential for policy formulation in complex environmental issues and in different scales from regional to international level.

The theme of soil and water ecosystem functions includes research needs related to changes and interactions of biogeochemical cycles, soil carbon dynamics and climate change impacts on it, balancing bioeconomy pressures with needs to adapt to climate change and protect biodiversity in forests and mires, identification of soil-related preconditions for sustainable intensification of food production, and assessment and mapping of soil ecosystem services.

Circular economy and sustainable management of soils and waters theme included two research topics: innovative ways of material recycling and re-using land areas to prevent

depletion of minerals and nutrients and minimise land uptake, and improved risk management and sustainable remediation of soils and waters.

Sustainable urbanisation and infrastructure development theme was discussed from different angles. Guaranteeing healthy environment, reduction of carbon emissions and use of natural resources and the functioning of green infrastructure were identified as main research challenges. Also infrastructure development and maintenance were seen to require new and sustainable solutions.

Under the theme of integrative land use policies and planning, methods to integrate targets of different land uses and create shared understanding, use of policy instruments both in growing and declining regions, and defining of best locations for new developments and infrastructure were emphasised as research topics. Also ways to enhance social acceptance and develop environmental regulation and de-regulation were considered important.

Climate change mitigation was included in practically all earlier mentioned research themes, but climate change adaptation was also identified as a separate cross-cutting theme to which many other topics were related to. Especially questions from adaptation capabilities in Nordic conditions were raised here.

Science-policy/practice interface includes many channels through which research findings are conveyed to decision-making and practical operations. Scientific research is used and accessible mainly to knowledge producers in universities and research institutes, but scientific research lies often in the background of more practical publications that are used by other knowledge users in public and private sector. For many stakeholders, guidelines, surveys, professional journals and web pages are the main sources of knowledge and they are complemented by direct contacts and meetings with researchers, easily accessible research reports and reviews gathered in consultant works.

Knowledge end users express the need to receive the essential knowledge in a concise and easily understandable form. They also need help in assessing the quality of the available information. Knowledge users hope that research findings and datasets would be gathered under a common web portal and new communication channels would be used more often. Illustrative examples of good practices, maps, graphs and other visual material are found useful in communicating results to decision-making in a compact form.

Ministries and other funder organisations are able to direct funding to questions that they emphasise. End user and knowledge provider organisations have more limited and indirect opportunities to influence research agendas.

Synthesising research findings to decision-making and communicating about the synthesis appeared as a key aspect in science–policy/practice interface. Relevant and easily applicable knowledge like policy briefs and interpreted scientific data should be available more openly. Research institutes and universities should communicate more actively about most recent and relevant research findings and consider the usability of their research findings more extensively. Visibility in the media contributes significantly to the functioning of science–policy/practice interface. Science–policy/practice interaction should happen more in two ways. Stakeholders pointed out that researchers should be more involved in the planning of research programmes and articulate their interpretations more explicitly

Several sources of funding were identified regionally, nationally and internationally. The alignment and interfaces of different funding systems should be considered more carefully in the future. Competition for research funding was considered by the stakeholders to be getting more intense. The profitability of large project calls was questioned due to the huge amount of wasted work done for abandoned project applications. According to stakeholder representatives, research calls should be more often carried out in stages, with more elaborate contents only in later stages, and well rated but unsuccessful proposals could be gathered into a project bank for some time, waiting for funding opportunities.

Merging public and private funding was seen necessary by the stakeholders. Private investments to research foundations could be favoured in taxation. One way to channel private funding to research could be through foundations or funds, where both private and public sector could invest. Public fundraising was also mentioned as an opportunity.

Soil and land as a resource was thought by many stakeholder representatives to be partly neglected topic in large scale research agendas. Many experts expressed worries over the funding of basic research, monitoring and maintenance of data pools, which were regarded as a publicly funded task. Soil monitoring is lacking permanent funding. Synthesis of existing data and integrated approaches combining different fields of expertise, were noted to deserve more attention.

5.1.2 Finnish version

EU:n Horisontti 2020 -ohjelmasta rahoitetussa INSPIRATION-hankkeessa on kartoitettu keskeisimpiä maankäyttöön ja maaperään liittyviä tutkimustarpeita yhteensä 16 Euroopan maassa. Kartoituksen perusteella laaditaan strateginen eurooppalainen tutkimusohjelma, joka vastaa aihepiiriin liittyviin nykyisiin ja tuleviin tarpeisiin yhteiskunnassa. Lisäksi hankkeessa selvitetään tutkimusohjelman toteuttamistapoja sekä kootaan julkisten ja yksityisten tahojen yhteistyöverkostoa ohjelman rahoittamiseksi.

Hankkeessa käsiteltiin laajasti maaperään ja maankäyttöön liittyviä kysymyksiä. Tarkastelun kohteina ovat esimerkiksi maa-alueiden käyttö rakentamiseen ja elinkeinotoimintaan, maankäytön suunnittelu, maaperän laatu ja suojelu, maa-aineshuolto, maisemanhoito, pilaantuneiden maa-alueiden käyttö ja pohjavesien suojelu. Tärkeitä näkökohtia ovat luonnonvarojen käytön kestävyys sekä eri maankäyttömuotojen yhteensovittaminen ja vaikutusten arviointi. Hankkeessa arvioitiin, mitkä ovat tällä hetkellä pahimpia tiedon puutteita ja millaista uutta tutkimustietoa tarvitaan, jotta voidaan ratkaista yhteiskunnallisia haasteita ja tuottaa uusia innovaatioita ja liiketoimintamahdollisuuksia.

Kussakin maassa tietojen keruusta ja analysoinnista vastasi kansallinen yhteistyötaho, jollaisena Suomessa toimii Suomen ympäristökeskus SYKE. Tutkimustarpeiden kokoaminen toteutettiin yhteistyössä tiedon loppukäyttäjien, tutkimusrahoittajien ja tiedontuottajien kanssa. SYKEn tutkijat kokosivat yhteen olemassa olevaa tietoa, haastattelivat keskeisten sidosryhmien edustajia, järjestivät sidosryhmien edustajille kansallisen työpajan. Haastatteluja tehtiin yhteensä 14 kpl ja niihin osallistui yhteensä 23 henkilöä. Haastatellut asiantuntijat edustivat melko tasaisesti rahoittajatahoja (seitsemässä haastattelussa), tiedon loppukäyttäjiä (yhdeksässä haastattelussa) ja tiedon tuottajia (viidessä haastattelussa).

Työpajaan osallistui yhteensä 32 henkilöä, joista neljä edusti rahoittajatahoja, 15 tiedon loppukäyttäjiä ja 13 tiedon tuottajia.

Erilaisten sidosryhmien ja näkökulmien tavoittaminen oli olennaista, jotta kansallisesti tärkeät asiat ovat esillä pohdittaessa eurooppalaisen tutkimuksen asialistaa. Haastateltavat asiantuntijat valittiin siten, että monenlaiset eri toimialat ja tieteenalat sekä organisaatiot ovat edustettuina. Haastateltaviksi pyydettiin maankäytön suunnittelijoita, yritysten ja etujärjestöjen edustajia, maaperä- ja vesiasiantuntijoita, tutkijoita, rahoittajia, säädösvalmistelijoita ja poliittisia päättäjiä.

Yhteiskunnallisista haasteista haastatteluissa useimmin mainittuja olivat raaka-aineiden ja resurssien kulutuksen vähentäminen, resurssitehokkuus ja kiertotalous. Myös ilmaston muutoksen lieventämistä ja siihen sopeutumista pidettiin tärkeänä tulevaisuuden tutkimusaiheena. Ruuan ja juomaveden turvallisuutta pidettiin hyvin tärkeänä globaalisti, mutta Suomessa niihin ei koettu kohdistuvan kovin suurta uhkaa. Kaupunkien kehittämisessä elinympäristön terveellisyyteen liittyvistä kysymyksistä nähtiin tarvittavan lisää tietoa ja parempia, integroivia työtapoja. Erilaisten maankäyttömuotojen yhteen sovittamisessa nousivat esille luonnon monimuotoisuuteen, vihreään infrastruktuuriin ja ekosysteemipalveluihin liittyvät asiat.

Suomen osalta haastattelujen, kirjallisuusselvityksen ja työpajan tulokset koottiin käsillä olevaan kansalliseen raporttiin. Kansallisia raportteja käytetään pohjana laadittaessa eurooppalaista strategista tutkimusohjelmaa ja tunnistettaessa ylikansallisia yhteistyömahdollisuuksia.

Kerätyn aineiston pohjalta tunnistettiin tärkeimpiä tutkimusaihepiirejä ja esitettiin niihin liittyviä keskeisimpiä tutkimuskysymyksiä. Suomen kansallisessa raportissa eriteltiin kaikkiaan 16 tutkimusaihepiiriä, jotka sijoitettiin kuuden teemakokonaisuuden alle. Kustakin aihepiiristä esitettiin 4-8 tutkimuskysymystä.

Tiedon kokoamiseen, analysointiin ja arviointimenetelmiin liittyvässä teemassa painotettiin tutkimustarpeina eri maankäyttömuotojen ja ilmastonmuutoksen vesistö- ja pohjavesivaikutusten arviointia, luotettavien ja kustannustehokkaiden näytteenotto- ja analyysimenetelmien kehittämistä sekä tiedon kokoamista ja yhteen vetämistä politiikkatoimien tueksi.

Maaperä- ja vesiekosysteemien toimintaan keskittyvässä teemassa esitettiin tutkimustarpeita, jotka liittyvät maaperän ja vesien geokemialliseen kierron vuorovaikutuksiin ja muutoksiin, maaperän hiilen dynamiikkaan, metsien ja suoalueiden muutoksiin ja käytön haasteisiin, ruuantuotannon maaperään liittyviin edellytyksiin sekä maaperän ekosysteemipalvelujen arviointiin.

Kiertotalouden ja maaperän ja vesien kestävään hallinnan teemassa nostettiin esille maa- ja kiviaineksen kierrätykseen ja maa-alueiden uusiin käyttömuotoihin sekä maaperän ja pohjavesialueiden riskinhallintaan ja kestävään kunnostukseen liittyviä tutkimustarpeita.

Kestävään kaupungistumiseen ja infrastruktuurin kehittämiseen keskittyvässä teema-alueessa käsiteltiin monelta kannalta kaupungistumiseen ja terveelliseen elinympäristöön liittyviä tutkimuskysymyksiä sekä esitettiin infrastruktuurin rakentamisen ja ylläpidon tutkimuksessa huomioon otettavia asioita ja kiinnitettiin huomiota vihreä infrastruktuurin toimivuuteen.

Integroivan maankäyttöpolitiikan ja -suunnittelun teemassa korostettiin eri maankäyttömuotojen yhteensovittamisen menetelmiin liittyviä tutkimuskysymyksiä, ohjauskeinojen suuntaamiseen ja suunnittelumenetelmien kehittämiseen kytkeytyviä tutkimustarpeita sekä yhteiskunnalliseen hyväksyttävyyteen ja sääntelyyn liittyviä tutkimushaasteita. Kasvavien ja supistuvien alueiden erot tuotiin esille.

Ilmastonmuutokseen hillintään liittyviä tutkimuskysymyksiä sisältyi hyvin monen aihepiirin alle. Ilmastonmuutokseen sopeutumisen haasteet nostettiin esille erityisesti Pohjois-Euroopan näkökulmasta muita tunnistettuja aihepiirejä poikkileikkaavana teemana.

Tutkimustieto välittyy päätöksentekoon ja käytännön operatiiviseen toimintaan monen eri kanavan kautta. Tieteelliset artikkelit ovat käytössä ja saatavilla lähinnä tiedon tuottajilla yliopistoissa ja tutkimuslaitoksissa. Tieteellinen tutkimustieto on kuitenkin monien käytännöllisempien julkaisujen pohjana. Monet sidosryhmät hyödyntävät ohjeita, ammatillisia julkaisuja ja lehtiä sekä verkkosivustoja tärkeinä tiedon lähteinä, minkä lisäksi tutkimustiedon saantia täydensivät suorat yhteydet ja tapaamiset tutkijoiden kanssa, helposti saatavilla olevat tutkimusraportit ja konsulttien kokoamat koosteet tutkimustiedosta.

Tiedon loppukäyttäjät toivoivat saavansa olennaisen tiedon tiiviissä ja helposti ymmärrettävässä muodossa. He myös tarvitsevat apua saavan tiedon laadun arvioinnissa. Tiedon loppukäyttäjät ehdottivat, että tutkimustulokset ja tietoaineistot tulisi koota yhteen portaaliin ja uusien tiedonvälityskanavien käyttöä tulisi lisätä. Havainnolliset esimerkit hyvistä käytännöistä, kartat, kaaviokuvat ja muu visuaalinen materiaali ovat hyödyllisiä esiteltäessä tuloksia tiivistetysti päätöksentekijöille.

Ministeriöt ja muut rahoittaja tahot pystyvät suuntamaan rahoitusta tärkeänä pitämiinsä tutkimuskysymyksiin. Tiedon loppukäyttäjät ja tiedontuottajaorganisaatiot pystyvät vaikuttamaan tutkimusohjelmien sisältöön rajoitetummin ja epäsuorasti.

Tieteen ja politiikan / käytännön rajapinnassa keskeistä on tutkimustulosten yhdistely ja niistä viestiminen päätöksentekijöille. Olennaista, selkeästi esitettyä ja tulkittua tietoa tulisi olla koottuna tiiviissä ja hyvin perustellussa muodossa päättäjille ja asiantuntijoille suunnattuina kannanottoina (policy brief) ja muina vastaavina koosteina. Tutkimuslaitosten ja yliopistojen tulisi viestiä aktiivisemmin viimeaikaisista, keskeisistä tutkimustuloksista ja niiden tulisi miettiä tutkimustulosten hyödynnettävyyttä entistä kattavammin. Näkyvyys tiedotusvälineissä on edistää merkittävästi tutkimustiedon välittymistä päätöksentekoon ja käytännön toimintaan. Tieteen ja politiikan tai käytännön välisen vuorovaikutuksen tulisi olla kaksisuuntaista. Sidosryhmien edustajien mielestä tutkijoiden tulisi osallistua enemmän tutkimusohjelmien suunnitteluun ja kertoa näkemyksistään avoimemmin.

Tutkimuksen rahoituslähteitä tunnistettiin useita alueellisesti, kansallisesti ja kansainvälisesti. Lisäksi hankkeessa selvitettiin, miten sekä millaisia kansallisia ja kansainvälisiä rahoitusjärjestelmiä tarvitaan tulevaisuudessa. Erilaisten rahoitusjärjestelmien yhdistelmiä ja kytkentöjä nähtiin tarpeelliseksi tarkastella huolellisesti. Yhteiskunnallisten haasteiden tulisi hankkeeseen osallistuneiden sidosryhmien edustajien mielestä olla tutkimusaiheiden määrittelyn lähtökohtana.

Kilpailun tutkimusrahoituksesta koettiin kiristyneen. Suurten tutkimushakujen kannattavuus kyseenalaistettiin hylättyihin hakemuksiin käytetyn suuren työmäärän vuoksi. Sidosryhmien edustajat ehdottivat tutkimushakuihin vaiheittaista toimintatapaa, jossa yksityiskohtaiset hakemukset jätettäisiin vasta loppuvaiheessa. Ehdotettiin myös, että hyviksi arvioidut hankkeet, jotka jäävät ilman rahoitusta, voisi koota projektipankkiin joksikin aikaa odottamaan uusia rahoitusmahdollisuuksia. Julkisen ja yksityisen rahoituksen yhdistämistä pidettiin tarpeellisena. Ehdotettiin, että verotuksessa voitaisiin suosia yksityisten tahojen tutkimussäätiöihin tekemiä sijoituksia. Yksityistä rahoitusta voitaisiin ohjata tutkimukseen säätiöiden tai rahastojen kautta, mikä mahdollistaisi yksityisen että julkisen sektorin investoinnit. Joukkorahoitus mainittiin myös yhtenä mahdollisuutena.

Monet sidosryhmien edustajista pitivät maaperä ja maa-alueresursseihin kohdistuvia tutkimusaiheita laiminlyötyinä. Monet asiantuntijat ilmaisivat huolensa perustutkimuksen, seurantojen ja tietovarantojen ylläpidon rahoituksesta, joka tulisi tapahtua julkisin varoin. Maaperäseurannoilta puuttuu kuitenkin pysyvä rahoitus. Synteesien tekoon olemassa olevasta tiedosta sekä eri asiantuntemusaloja yhdistäviin integroituihin lähestymistapoihin tarvittaisiin enemmän panostusta.

5.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for Finland. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation”. In Finland, totally 14 NKS interviews were accomplished. The number of people interviewed was 26. In several interviews, two or more representatives of the organisation participated in the interview. The interviewees represented altogether 11 different organisations. When several people were interviewed from one organisation, they were selected by the interviewer or by the organisation to represent different departments or areas of expertise. The interviewed experts represented quite equally three target groups: funders (7 stakeholders), end users of knowledge (9 stakeholders), and knowledge producers (5 stakeholders) . The Details on these NKS are provided in Annex I.

The national key stakeholder workshop was organised on November 19th-20th in 2015 in Finnish Environment Institute (SYKE) in Helsinki. The workshop had altogether 32 participants who were present on either of the days or both of them. 13 of the participants represented knowledge producers, 15 end users and 4 funders. Several people had more than one role. Invitations to the workshop were send emphasising also funders, but the distribution of registered participants was different from invitations. Nobody interested was however denied from taking part in the workshop. The Details on NKSs who participated in the workshop are provided in Annex II.

The desk study was based on documents as suggested by NKS and identified by the project researchers. These are listed in Annex III.

The draft of this Finnish national part of this deliverable 2.5. was sent twice for a review to all NKS who were previously interviewed or participated in the workshop. The NKS had an opportunity to comment on the draft firstly in the end of January and secondly in the middle of February 2016. Seven people sent their comments. Three of these experts who commented were from one organisation and had collected their comments in one document.

5.3 Research and Innovation (R&I) needs

5.3.1. Societal challenges and needs

Reduction of raw material and resource consumption, resource efficiency and circular economy was mentioned most often by the stakeholders as the important societal challenge. Climate change mitigation and adaptation to change were also considered by many as a societal challenge that the future research activities should contribute to. Food and drinking water safety were regarded highly important, but risks related to them were thought to be only moderate at the national level, but critical globally. Healthy living environment was seen as a general goal of urban development requiring sufficient data and methods for integrated planning. Research needs related to biodiversity, green infrastructure and ecosystem services were also mentioned particularly in connection with fitting different land uses with each other. Security of infrastructure and energy distribution was considered as a less stressed issue from land use, soil and land management perspective, but the impacts of infrastructure development and energy production was mentioned as essential theme.

5.3.2. Topics / research needs to include in the SRA

Research topics suggested to the SRA have been gathered on the basis of NKS interviews, national NKS workshop and literature review focusing on research strategies and agendas of different research institutions and administrative sectors. Identified research needs are summarized under 16 research topics with specified research questions under each topic. Research topics are grouped in six thematic areas.

The main research agendas and strategies were reviewed and taken into account when defining the research topics. The Academy of Finland provides funding for academic research covering the full spectrum of scientific disciplines and also defines themes for strategic research calls that are aimed to support long-term and programme-based research. Research topics are considered in the strategies and particularly in R&D strategies of different ministries. Sectoral research institutes working under the ministries also specify their focus areas. In addition, Government working group for the coordination of research, foresight and assessment activities specifies research themes for its own funding activities. The important and relevant documents, research agendas, research programmes underpinning these considered topics are found in Annex II.

Thematic area A: Data gathering, analysis and assessment methods

FI-1 Assessing the impacts of different land uses and climate change on the quality and quantity of surface waters and groundwaters

The allocation of different land uses and vegetation on different kinds of soils has a crucial impact on the quality of runoff waters and groundwater. Finnish aquifers are small, shallow and scattered formations. Because of glaciofluvial origin their permeability is also quite high so they are very sensitive to contamination. The nutrient runoff from fields depends on where the fields are located and the ways in which they are farmed. Vegetation can be used to infiltrate waters, but it may act as a source of natural runoff of nutrients in the autumn. Most discharges of nutrients and impurities often originate from a rather small part of the total area. Acid sulphate soils in Baltic Sea coastal areas are particularly sensitive to land use changes and infrastructure developments that can cause considerable leaching of metals in those areas. More knowledge is needed on what the exact effects of specific land uses are, how they may change due to climate change and through what means harmful effects can be minimised.

Possible research questions may be:

Net impacts

- How to identify the short and long term impacts of certain land use changes on the quality, quantity and temperature of surface and groundwater?
- How to identify the impacts of storm water drainage on waters?
- How to observe land use impacts on water ecosystems and groundwater depending ecosystems?
- How do different land use policies, such as agricultural policy and city planning policy, contribute to the environmental impacts of land use?

Land management

- How to detect the most effective ways to improve water quality e.g. through modelling and systemic approaches?

FI-2 Development of reliable sampling and analysis methods

Increasing pressures on renewable natural resources emphasise the need to monitor the impacts of resource use more closely than before. Meanwhile, the amount of financial resources to organise monitoring are decreasing. This calls for developing and harmonizing monitoring and improving the cost efficiency of data production through joint acquisition of data and combination of data from different sources. Data collection should also be prioritised on the basis of the definition of essential parameters.

Automation, remote sensing techniques and modelling help to cut the expenses of sampling, but there is also a need for quick, light and movable sampling methods and analysis techniques. Time and money are saved and changes in sample quality could be avoided if samples were analysed on site without transportation to laboratory. Challenges are related e.g. to reliable and more accurate measurements of low concentrations of various substances (e.g. available phosphorus, other nutrients, and hazardous substances), and the analysis of rock aggregate quality. Development of sampling and analysis methods should be done in wide co-operation between research institutes, universities and developers of measuring instruments.

Current complex environmental problems need also more comprehensive research methods to be resolved. New methods to use big data resources and integrate data from different fields of knowledge can open up new ways to carry out cost-efficient research. Combining study results from different research sectors might open brand new ways to solve problems in sustainability issues. Possible research questions may be:

Net impacts

- What are the essential parameters which describe the harmful short- and long-term effects and combined effects of substances?
- How to detect harmful substances and determine concentrations of available phosphorus in soils, groundwaters and surface waters as reliably, cost-effectively and as much in real time as possible?

Land management

- How to develop on site sampling and analysis methods for different relevant substances, anaerobic samples, and soil and rock samples?
- How to organize joint production of field data, where samples are taken, observations are made or automated monitoring is used for multiple needs (soils, waters, land use, biodiversity) at one occasion?
- How to improve analysis methods and multidisciplinary use of different sources of data – field observations, geophysical mapping, observations made by citizens, remote sensing and other GIS-based data as well as modelling and model-based data?
- How to find new ways to produce, use and manage big data resources concerning soils, land use, groundwater and surface water interactions for various needs of the society?
- How to process and use real time data on environmental conditions for different operational purposes in forestry, agricultural and other sectors?

FI-3 Gathering and synthesizing data on the state of soils and waters for policy formulation

Policy formulation concerning land use and soil-sediment-water systems in both European and national levels calls for a holistic view on the current state of soils and waters in different areas. The identification of biggest challenges should be based on a synthesis of research findings in different disciplines.

Consequences of policies, both direct and indirect, should be studied carefully, because causal chains can be long. E.g. the areal allocation of agricultural subsidies has resulted in spatial differentiation of animal husbandry from plant production in Finland, causing problems to find sufficient amount of fields for spreading manure in the areas of intensive animal production, which has led to an increase in the clearing of peatlands with consequent high greenhouse gas emissions.

Furthermore, the coverage and compatibility of basic datasets, such as geographic data on European soils, needs to be enhanced. At the moment, the data on minerogenic soil characteristics in EU countries are not in line with each other and are not suitable e.g. to define agricultural risk areas. Current names of soil types don't take into consideration soil moisture which might become more important along with changing climate. Organic soil classification varies considerably from country to country and this leads e.g. differences in calculations of GHG-emissions.

Possible research questions may be:

Net impacts, demand:

- What would the criteria and ways to comprehensively assess the use of natural resources?
- How to maintain and combine different time series data to detect long-term changes?

Land management:

- How to promote the harmonisation of classifications (e.g. organic soils) and gather comparable attribute data on soils and other surficial deposits?
- How to gather evidence base for decision making and summarise diverse research findings in a comprehensive way?
- How is the knowledge used in policy formation and how are the consequences of chosen policies considered?
- How to combine the various information resources together so that they would be widely and easily accessible as possible and combinable e.g. in a common research portal?

Thematic area B: Soil and water ecosystem functions

FI-4 Interactions, changes and resilience of biogeochemical cycles in soil-water-sediment system

Biogeochemical cycles are the basis of the provision of ecosystem services and healthy living environment. Human activities have many impacts on biogeochemical cycles, and it is not sufficiently known how different impacts together change the cycles and their interconnections. The resilience of soils is also becoming increasingly important as environmental conditions are changing because of climate change. Soil-groundwater-surface water interactions are poorly known, because there is a lack of both field investigations and models which really take into account these interactions.

Possible research questions may be:

Natural capital:

- How do soil biogeochemical cycles operate as a whole and how can their resilience be determined?

Net impacts:

- How does the human impact change biogeochemical cycles?
- How to identify soil-groundwater-surface water interactions in different kind of ecosystems?

Land management:

- How the resilience of soils is enhanced in changing circumstances, such as in warming climate?
- What could be done to promote the adaption of society to changes in biogeochemical cycles?

FI-5 Soil carbon dynamics

Soil acts as a major carbon storage and soil carbon is an important factor in global carbon balance and management. Present methods to assess soil carbon amounts and changes are however uncertain and in many ways insufficient. Soil carbon dynamics has been modelled (such as YASSO model of Finnish Environment Institute), but the application of models in different land use types and wider geographical contexts requires further development and more knowledge of the significance of the soil type, climate factors and e.g. nitrogen dynamics. Soil carbon sensitivity to temperature varies according to climate zone, soil structure and the type of carbon input. In the case of soil carbon accounting of agricultural soils, there are only few coefficients divided by climate zones. More precise inspection by climate zones and other factors is needed. Previous studies have suggested that boreal forest soils may release much more carbon in the future, as the climate change proceeds. The ways to mitigate climate change by increasing carbon in soils requires more attention in the future studies.

Soil carbon has importance also in terms of soil structure, productivity, biodiversity, erosion reduction, water quality and water balance. The whole soil-sediment water system needs to be addressed when examining soil carbon, because carbon flows also with water. The impacts of land use changes on soil carbon circulation need to also be better understood.

Possible research questions may be:

Natural capital:

- What is the amount of soil carbon storage and how does it change in areas of different land use?

Net impacts:

- What is the precise role of soil carbon in climate change mitigation in areas of different land use (possibly using BioSoil-data and other sources of data)?
- What are possibilities to restore or increase the amount of soil carbon storages?
- How to improve the soil carbon assessment methods that e.g. Intergovernmental Panel on Climate Change (IPCC) is using?

Land management:

- How to develop a life-cycle analysis (LCA) based model of soil carbon for minerogenic soil and peat?

FI-6 Changes and challenges in forests and mires

In forested and relatively sparsely populated countries, such as Finland, the use and refinement of forest biomass has been a significant cornerstone of the economy for a long time. Forest management practices, including drainage of much of the mires, have aimed to intensify the wood biomass production. Today, new economic growth and jobs are sought through an increase in the bioeconomy businesses that encompasses all kinds of production based on renewable natural materials, including the further development and use of innovations and technologies related to such materials. The aim is to secure the competitiveness of the existing industries and provide them with opportunities to grow. Bioeconomy is also expected to enhance the viability of regions by promoting regional self-sufficiency and assuring that the benefits from the activities remain in the area. Much of the targeted growth in bioeconomy relies on the introduction of high added value products and services as well as new uses of wastes and industrial side streams. However, bioeconomy will also increase the financial use of forests. Due to forest management, the biomass growth has accelerated, but in terms of carbon sinks and biodiversity protection, more intensified use sets also challenges. There is a need to foster site productivity and environmental sustainability. Intensive removal of biomass from forests takes away considerable amounts of nutrients. Intensive collection of biomass from previously drained mires now growing forest can also result in major impacts on waters.

Northern forests and mires are also facing challenges caused by climate change that is predicted to lead to more than average warming particularly in the northern parts of Europe. This will cause increase in forest growth, but also alteration of habitats, introduction of new species, and spreading of alien species. New insect pests could possibly cause damage on a massive scale.

Land use changes from forest and mire areas to agricultural land and built-up areas have mostly already taken place, but particularly around growing urban centres and in areas of intensifying agriculture, new developments are taking place. Land use changes have made the landscape structure fragmented and future challenges lie in the integration of green structure. Also the restoration of altered habitats, especially drained peatlands, is an important question. As peatlands have stored massive amounts of carbon, their use, restoration and protection is globally a crucial issue.

Possible research questions may be:

Natural capital

- In what ways will forests and mires change along with climate change, what are the consequences of the changes and how to prepare for them?
- Through what ways can decentralised, resource-efficient bioeconomy enhance the viability of regions?

Land management

- How can intensified use of forest biomass be balanced with objectives related to biodiversity, carbon sinks, site productivity and environmental sustainability?
- How to promote integrated green structure, restoration of drained mires and other critically altered habitats and manage pressures towards land use changes?
- How to develop policy instruments to minimise negative environmental impacts of the bioeconomy development?

Net impacts

- What are the impacts of forest cutting, forest renewal and ditch network maintenance on runoff waters from drained mires?

FI-7 Soil-related preconditions for sustainable intensification of food production

Importance of food safety is increasing due to climate change and population increase. It is important to maintain and when necessary to improve soil functions and also intensify farming where possible. In the Northern Europe, agriculture should adapt to changes like shortening of frozen ground periods and increasing rains which can cause deterioration of soil granular structure and leaching of nutrients. Warming climate enables growing of new crops but these southern plants might not adapt to northern longer day. Organic farming has increased, but its effects to soil are not well known. Circular economy will increase demands to recycle manure and wastes and more data is needed how make it safely and cost efficiently.

Possible research questions may be:

Natural capital

- How to assess the resources of soils to foster productivity in different types of areas and according to soil properties and biodiversity?

Demand:

- Where and how sustainable intensification of food production is possible?
- How can the use of fertilizers be substituted by recycling nutrients from suitable biomasses, such as improving the managing of manure?

Net impacts:

- What are the impacts of nutrient recycling and organic farming to soil functions, ecosystem services and national economy?
- How much can productivity and crops be improved with soil management and crop rotation and what would be the alternative methods and measurements?

Land management:

- What kind of cultivation methods are environmentally and economically sustainable in changing climate?

FI-8 Assessment of soil ecosystem services and biodiversity

Soil ecosystem services have not been researched as extensively as superterranean ecosystem services, despite soil and groundwater constitute an integral part of most ecosystem functions. Soil contributes to e.g. ecosystem productivity, efficient use of nutrients, cleaning harmful substances from waters. The biodiversity of soils is a precondition for the production of ecosystem services. The diversity of species in the soil has an impact on soil structure and resilience, particularly in changing environmental conditions. The connection of soil genetic diversity to soil biological functions and ecosystem services needs also particular attention. Gene-mining and exploitation potential of genetic diversity can open new business possibilities e.g. new drugs. This can be supported by the establishment of national biodatabank and maintaining microbe stocks that have been isolated, identified and already utilised. Potential beneficiary and financer is pharmaceutical industry.

Possible research questions may be:

Demand:

- How soil and water-related ecosystem services can be mapped, assessed, monitored, valued, productized?

Natural capital

- What are soil functional and genetic diversity's connections to ecosystem processes and – services?
- How to identify in different areas the most important ecosystem services to be secured and what are necessary measures to maintain and increase them?

Land management

- How to use soil genetic diversity to promote new businesses in a sustainable way e.g. through identifying potentially exploitable microbes, maintaining already identified and utilised microbe stocks and establishing a national biodatabank?
- How soil and water-related ecosystem services can be taken into account in land use planning?

Thematic area C: Circular economy and sustainable management of soils and waters

FI-9 Innovative ways of recycling materials and re-using land areas

Depletion of many non-renewable natural resources, such as minerals and nutrients, is an increasing problem. Sand and gravel has been used for decades in the construction of buildings and infrastructure. Some resources, such as gravel and good quality aggregates, have become scarce close to their consumption in cities and have to be transported considerable distances. Promoting the recycling of materials can help to guarantee their availability and decrease environmental impacts, but methodology and procedures need to be further developed. As extraction activities are often only temporary, the re-use of land areas is an important issue and can provide new opportunities.

Possible research questions may be:

Demand:

- How to manage the supply and demand of soil and aggregates in local and regional level through effective and appropriate re-use of various types of excavated soil, and organisation of temporary storage for classified materials?
- How to advance the recycling of limited mineral and nutrient resources (e.g. through capturing phosphorous from wastewater or landfill mining)?

Land management:

- Which are the most effective policy instruments to promote the use of substitutive products and excavated soils especially for gravel and restrict the disposing of excavated soil materials at landfills?
- How to take the supply and demand of soil and aggregate resources into account in land use planning already in the early phase?
- How to ensure that the best available technology is used and lifecycle sustainability is taken into account reuse/recycling of excavated contaminated soil materials?
- How to realise new ways to re-use brownfields, mines and aggregate extraction areas, e.g. in urban development, recreation or as restored nature areas?

FI-10 Risk management and sustainable remediation of soils and groundwater

Many risks are connected to different land uses, soil and water properties and emissions from different sources. To adopt sustainable risk management, new knowledge is needed on the recognition of risks, dealing with different types of risk areas, defining responsibilities, communication on risks, and the procedures and target levels of remediation. Risk sites need to be identified, investigated and remediated systematically. Risks need to be considered more comprehensively. E.g. risk assessment for waters should take into consideration both water supply, groundwater depending ecosystems and river basin – not just one of these.

Information on risks is important be available in a user-friendly way. Restoration methods should be cost-efficient, save on natural resources, minimise adverse environmental impacts and promote circular economy. Land use and risk management need to support each other. Efficient risk management and remediation requires also interactive procedures, co-operation of public authorities and other stakeholders, and transparent communication.

Possible research questions may be:

Land management

- How to improve risk-assessment methods, promote the use of databases and models in the assessment, and make the assessment more systematic and comprehensive to deal with different kinds of (ecological, technological and economic) risks?
- What new policy instruments are needed and how the existing instruments should be developed to support sustainable risk management - the most effective administrative, economic and informative instruments?
- How can sensitive areas and functions be dealt with in risk management and land use planning?
- How to communicate about risks openly, transparently and interactively paying attention to the availability of data and privacy protection?
- How to organize remediation activities in a cost-efficient way minimising the use of natural resources and environmental impacts and learning from failed projects?
- How to define sufficient level of purification for contaminated areas?
- Which in situ and on-site remediation methods are suitable to northern soils and groundwaters and how to ensure that the most sustainable remediation methods are used?

Thematic area D: Sustainable urbanisation and infrastructure development

FI-11 Sustainable urbanisation and healthy living environments

The future success and welfare of the society is greatly dependent on how the urbanisation process is carried out. To promote sustainable urbanisation, more knowledge is required on drivers and trends related to urbanisation and opportunities to create healthy environments, reduce carbon emissions, use of natural resources sustainably and integrate built and green infrastructure. The ageing of population and advancements in technology change the way of living in urban areas. The quality of environment is becoming increasingly important for cities to be attractive. Noise, impurities in the air, heat periods and lack of connections to nature will continue to be urban challenges in the future. Green infrastructure and nature-based solutions can be used to alleviate problems and produce new benefits in the form of recreation opportunities and other ecosystem services. Health issues are receiving growing attention, and the location of sensitive functions and population groups is emphasised.

Possible research questions may be:

Demand

- How will the continuation of the urbanisation process change the need for natural resources and ecosystem services in the future?
- How to better understand processes and interconnections related to urbanisation?

Net impacts

- How to prevent urban sprawl, minimise land take and support sustainable use of built-up areas?
- What are the appropriate methods, models and tools to assess sustainability of urban development?
- How to use green infrastructure and technical solutions to tackle problems with noise, and poor air quality and create pleasant environments for everyday life?

Natural capital:

- How to guarantee and improve the functioning of ecosystem services in urban areas?
- How to introduce market mechanisms for compensating harms to nature areas e.g. through improvements in other areas or use of temporary “ecosystem hotels”?

Land management

- How to secure water supply around big cities (e.g. considering both the changing environment and climate and the use of gravel/aggregates)?

FI-12 Sustainable infrastructure development and maintenance

Environmental impacts of infrastructure development are less well known than impacts from energy production, building construction or vehicles. However, infrastructure investments and maintenance costs are considerable. The state, regions and municipalities are forced to carefully consider and prioritise budgeting for infrastructure. Climate change causes new pressures and disturbances on the infrastructure, which should be taken into account. In the transport sector, new infrastructure development concentrates on growing urban regions and their connections. Elsewhere, the focus is on the maintenance of present infrastructure. In energy sector, the need for district heating networks is changing due to increased energy efficiency of buildings and the development of new energy sources, such as geoenergy. Groundheat use sets new requirements on planning of subterranean land use and on the assessment of environmental impacts of heatwells. Green infrastructure is being used to substitute technical grey infrastructure e.g. in stormwater management. Nature-based solutions can provide alternatives to traditional technical solutions with less development costs and multiple benefits.

Possible research questions may be:

Land management

- How to increase the resilience of infrastructure to extreme weather events and changing climatic conditions, such as increasing rainfalls?
- How to assess the carbon footprint and material consumption of infrastructure development and maintenance and promote low carbon and resource efficient solutions, e.g. in the transport sector?
- How to take advantage of nature-based solutions in infrastructure development, e.g. in water management
- How to sustainably promote geoenergy and shallow groundheat use? How to find suitable areas for different geoenergy and groundheat use methods?

Thematic areas E: Integrative land use policies and planning

FI-13 Integration of different land uses

Integration of different land use targets is the main purpose of land use planning. New and expanding ways of using natural resources together with sustainable development objectives have increased the need to integrate different targets in both rural and urban areas. Controversies are related e.g. to mining, energy production, and the extraction of aggregates. Information on planned areas and impacts of alternative solutions is a necessary basis for integration. A common knowledge base may also help to create shared understanding of planning situation.

Possible research questions may be:

Demand:

- In what ways to address the integration of land uses from a 3D or 4D perspective paying also attention to competing uses of subterranean spaces?

Land management:

- How to learn from best practices of cross-sectoral integration of targets and creation of common understanding with the help of shared knowledge?
- What kind of new cost-benefit analysis and impact assesments are needed to integrate and value different kind of land use solutions (e.g. community development/water supply)?
- How to develop and promote integration in all the phases of land use management – in land policy, planning, decision-making, plot assignment and implementation?

Net impacts

- How to develop assessment tools that consider the sustainability impacts of alternative land use solutions?

FI-14 Development of land use policies and planning methods

Integrative governance of land use and spatial structure calls for new planning methods and ways of using policy instruments. Many and often controversial objectives are related to land use choices, and decisions are often based on difficult weighing of benefits and disadvantages. One of the biggest challenges related to land use planning is considering urban region as a whole. Most urban regions consist of several municipalities that compete with each other trying to attract new jobs and inhabitants. There are significant differences between municipalities in land use policy. Because of the lack of common master planning and co-operation, the development has led to suboptimal results in the whole urban region. Consolidation of the urban form should be based on an analysis of urban region to determine best locations for future development.

There are big differences between growing and declining areas, and same policy instruments don't work for both of them. Land use policies need to better enable and support the choosing of sustainable options.

Possible research questions may be:

Land management

- How to enhance integrated governance of urban regions, policy coherence and co-operation of different administrative bodies?
- How to deal with different values and objectives in decision-making e.g. with the help of multiple-criteria decision analysis?
- How to target policy instruments to different areas taking into consideration the differences between growing urban regions and sparsely populated rural areas.
- How to develop the use policy instruments to enable sustainability transitions?
- How to define best locations for new developments and infrastructure in order to consolidate the existing of urban form?
- How to take into account the geotechnical properties of development sites?
- How to take into account cultural historically and archaeologically valuable areas in land use planning?

FI-15 Social acceptance and environmental regulation

Social acceptance of decisions affecting the environment is receiving increasing attention, as social sustainability and participation in planning are emphasised. Also the increasing scale of construction projects has highlighted the need to deal with social impacts. The social acceptance has been discussed e.g. in connection with mining and industrial activities affecting the quality of water, contaminated lands and wind mill construction. In sparsely populated Nordic areas, where people's subsistence may depend on large areas, e.g. in reindeer-herding, social impacts should be considered broadly.

New tools and methods, such as e-participation and the use of social media, are being introduced to deal with social acceptability. Environmental regulation and de-regulation are also related to social acceptance. Functioning regulation can help to achieve social acceptance, but strict norms can also lead to outsourcing of jobs and negative impacts elsewhere.

Possible research questions may be:

Land management:

- What contextual factors have an effect on the acceptance of different land use and soil management issues by local residents and other stakeholders?
- Through what kind of measures and processes can social acceptance be addressed and achieved?
- How to develop the use of new participatory tools to promote the active role of citizens and stakeholders in planning processes and to increase common understanding of solutions?
- How to reconcile potential conflicts through negotiations and consensus-building methods?
- How to introduce new market-based mechanisms through which consumers can make sustainable choices?
- How to formulate environmental regulation nationally and internationally in order to avoid the loss of competitiveness in global markets and outsourcing of jobs and negative impacts elsewhere?

Cross-cutting theme: Climate change adaptation

FI-16 Climate change adaptation

Climate change mitigation and adaptation are related to all research topics. Some research questions rise particularly from adaptation capabilities in Nordic conditions and they can include:

Net impacts, land management:

- What are the consequences of decreasing ground frost to soil quality, geotechnical properties, nutrient leaching and agriculture?

Land management

- How to improve preparation for unexpected climate conditions in agriculture, forestry and built-up areas?
- How to organize storm water drainage and water supply to take into account more frequent extreme weather events?
- How to predict and prepare for increasing leaching of harmful substances from contaminated soils when sea levels and river flood levels are expected to rise?
- How to improve resilience/adaptation capacity through land use planning by paying attention to flood management and other ecosystem-based ways of adaptation?

Net impacts

- What are the impacts of increasing runoff waters during wintertime, more frequent and severe flood events and increased erosion?
- How does the climate change and extreme weather events affect the sufficiency of groundwater in relatively shallow aquifers and groundwater depending ecosystems?

5.4 Experiences regarding connecting science to policy/practice

5.4.1 Use of knowledge

Sources of knowledge

Scientific knowledge was seen by the national key stakeholders as knowledge produced by universities and research institutes. End users seldom search scientific knowledge from peer-reviewed articles, but many of them follow news about published research and learn about findings also through many sources, such as seminars and personal contacts.

Scientific articles are used, or overall accessible, mainly only in universities and research institutes. Researchers and other knowledge producers use many different kinds of data in their work. International research literature is the backbone of the work, and researchers often seek research findings that are comparable to their own work.

Scientific research results constitute only a part of the knowledge base that the end users take advantage of. Scientific publications are often quite extensive and results are explained thoroughly. For end users working with practical questions, it is important to receive the essential knowledge in a concise and easily understandable form. For practitioners, main sources of scientific knowledge are typically direct contacts and meetings with researchers, easily accessible research reports and reviews gathered in consultant works. Other sources of knowledge, such as guidelines, surveys, professional journals and web pages, are much more commonly used than scientific knowledge. However, scientific research lies often in the background of more practical publications that are used by public and private sector.

Some stakeholders, such as the ministries, have very good contacts to researchers and no difficulties in finding the data they needed. Some stakeholders have researchers also taking part in the development projects in a bigger or smaller role. Consultant work was often commissioned by some stakeholders, but it was seen to be restricted only to the questions mentioned in the commissioning.

Ways of using knowledge

Scientific knowledge is usually acquired for a particular purpose and used together with other data on the circumstances related to the issue that is under consideration. New case-specific data is often collected and analysed according to the principles developed in scientific research.

The use of scientific knowledge takes place in a certain context. The ministries use research findings to support policy preparation. Many stakeholders need scientific knowledge for the impact assessment of planned activities. Entrepreneurs use research-based standards and guidelines when applying for permits and planning their activities.

The level of research use varies in political decision-making. National and regional decision-making is usually based on knowledge acquired from different types of studies, but it is not always sure, whether the most relevant studies are used.

The interpretation of research findings is another challenge. When it is sometimes difficult for researchers to formulate conclusions in a way that is both informative and based firmly on findings, it may much more difficult for knowledge users to interpret the meaning of the findings in their own context. Particularly in small organisations and units, knowledge users

are often responsible for many different types of tasks and lack the competence to understand and apply research knowledge on issues that require specific expertise.

Knowledge is used for many different purposes. For example, ministries often use research data in the preparation of legislation and national programmes. Regions and municipalities concentrate on their own strategies and plans. Enterprises use knowledge in product development, operation and as a competing factor. Citizens and interest groups look for data that considers their own point of view.

Many end users of knowledge reported that they would need support in assessing the quality of the available knowledge. They regarded it important to distinguish, which research results are based on solid proof and can be generalised, which findings are more uncertain and context-specific and which results are produced in a survey without any particular scientific background or methodology. Interviewed stakeholder representatives also saw it essential to separate research pursuing objectivity from lobbying of different interest groups. Research knowledge should also be reliable, independent and transparent.

Promotion of knowledge use

Knowledge users hope that research findings and datasets would be gathered under a common web portal. Illustrative examples of good practices, maps, graphs and other visual material are found useful in communicating results to decision-making in a compact form. Data sharing and open data policies are also highlighted.

Small and medium-sized enterprises are reported to have limited resources to find latest research results. Linking the supply of knowledge to the processes, such as permit applications, where the knowledge is required is seen as the most efficient method of conveying research results to this audience. The enterprises are also said to benefit from clear, research-based standards and guidelines.

The use of research knowledge can be enhanced through careful planning of research projects and communication and interaction related to the project. When project proposals are assessed, attention should be paid to the usability of results in different areas and sectors. During the project period, it is crucial to have a steering group consisting professionals of different expertise to guide the research work. Research projects should also be able to apply the latest methods and technologies to create sustainable solutions.

The ways that research-based knowledge is disseminated to end users, needs to be developed. Articles, reports and web pages continue to be important ways to publish, but research projects and their results should presented to stakeholders more in common events, such as exhibitions, conferences and co-operation meetings. Also different ways of using social media in communication and marketing needs to be promoted. Also web-based tools, planning games and other knowledge applications are potential channels to bring research findings to end users.

The exchange of national and international experiences and knowledge is an important way to acquire state-of-the-art knowledge for end users. Gathering data on research projects and their findings on a common web portal would help to find relevant knowledge to a particular purpose. Also the geographic datasets on land use and soils should be easily available, extensive, up-to-date and rich in content.

The processing and dissemination of data could be sectorally centered (e.g. land use and soil portal). Knowledge producer institutions could employ experts that concentrate on gathering and refining knowledge to usable packages. This would help to bring out research findings of all accomplished projects to a wider audience than to the contact networks of single research group.

5.4.2 Possibilities to set the agenda

Stakeholders have very different opportunities to set the agenda for research projects depending on their role as a knowledge end user or funder, but also on their networking and representation in different working groups. Ministries have rather good opportunities to influence research agendas. Other funder organisations are able to direct funding to questions that they emphasise, too. Representatives of funder organisations are usually involved in specifying the topics for research & development project calls, and they also participate in the steering groups of the projects. End user and knowledge provider organisations have more limited and indirect opportunities to influence research agendas.

Soil and land management have seldom been in the centre of research programme agendas. According to the stakeholders that participated in INSPIRATION activities, there is a need to emphasise the significance of underlying soil and land as an issue in other research themes, such as urban development, resource efficiency etc. It was also noted that it is important to have several approaches to certain research problems so that decision-making is not relying only on single type of research methodology.

Research projects are increasingly cross-disciplinary and often rather extensive. Coordination of research calls and projects could be improved by developing co-operation between research organisations, public authorities, consultancies and enterprises. Preparing and carrying out of research projects requires good professional skills, and necessary know-how should be systematically acquired. Also ways of commissioning research projects are important. In addition to research agenda, conditions related to immaterial rights to use and publish results and copyright ownership are essential issues to define. When enterprises commission studies, the results can remain in their own use only.

Private-public partnerships and other co-operative ways of funding can solve some of the problems related to sufficiency of funding and involve necessary networks of knowledge users.

5.4.3 Science – policy – practice

Functioning and improvement of science–policy/practice interface

According to some stakeholders involved in INSPIRATION activities, research findings don't always end up in practical use, because funders and knowledge users are unaware of them, and similar research is carried out many times without researchers knowing from each other. This highlights the need for broad review studies on what is already known on basis of numerous studies that have been accomplished previously.

Synthesising research findings to decision-making and communicating about the synthesis appeared as a key aspect in science–policy/practice interface. Decision-makers often need relevant and easily applicable knowledge, and quickly. Stakeholders emphasise the need for policy briefs and interpreted scientific data. Research institutes and universities should communicate more actively about most recent and relevant research findings that are done by themselves or discussed in international scientific journals and conferences. From stakeholders' point of view, researchers ought to consider the usability of their research findings more extensively during the research process. Clear messages were hoped from the research projects, not new questions.

Visibility in the media contributes significantly to the functioning of science–policy/practice interface. The societal impact and topicality of the research influences the attention that its results receive. The steering group and communication experts can significantly promote the use of research results in decision-making. Policy makers and interest groups need to be addressed in communication about the results.

Science–policy/practice interaction should happen more in two ways. Stakeholders pointed out that researchers should be more involved in the planning of research programmes and articulate their interpretations more explicitly. Furthermore, some stakeholder representatives saw that policy objectives should have an effect on what kind of research is funded, and some thought that research needs should come more from enterprises. Worries were also expressed over emphasising merely societal influence, which could restrict the research topics too much and prevent new innovative openings.

Influencing research agendas

Funder organisations have experience on the formulation of scientific research topics and questions in the preparation of research calls and in steering groups of research projects. Some ministries are also steering the research institutes working under them. Large research and development projects often involve national or regional authorities as partners, identified stakeholders or steering group members. This settlement facilitates the use of research results in decision-making.

Political decision-making can be influenced in many ways. Many research institutes have representatives in working groups of the ministries, and research institutes have an opportunity to give statements on the legislation renewal, strategies and guidelines. Frontline researchers are often also heard in the committees of the parliament.

Political decision-making influences the ways that the research funding is carried out. During recent years, there has been a growing emphasis on the research serving the strategic and operational needs of the government. Researchers have also been asked to

propose themes for future research calls. The decision-makers' trust in researchers and their results has great significance in terms of functioning science–policy interphase.

International co-operation is required to import latest research findings to national discussions and also improve the international relevance of national research. European and international projects may serve the national needs of knowledge and enable studies that are not capable of getting national funding. The national dissemination of research results should be highlighted also in international projects.

Evaluation of the societal impact of research

The societal impact of scientific research is difficult for the stakeholders to evaluate. Ministries assess their own research and development activities and the Academy of Finland has carried out an assessment on the state of scientific research in Finland, first time in year 2014 and an update will follow in year 2016. In the assessment by the Academy of Finland, attention is paid to citation indicators, publications created in international cooperation, research infrastructures and division of work between universities. The assessment uses a categorisation of disciplines into 54 groups. It is stated that it is difficult to place interdisciplinary and phenomenon-based research in a traditional classification of disciplines. Soil and land use research falls very often into this kind of group and is included in disciplines of Environmental science, Forest sciences, Geosciences, Ecology, evolutionary biology, Agricultural sciences, Other natural sciences, Social and economic geography, Industrial and environmental biotechnology, Environmental engineering and Architecture, but also potentially in several other categories.

5.5 National and transnational funding schemes

5.5.1 Funding schemes and possibilities for research funding

Funding schemes in regional, national and international level

There are several funding opportunities in many presently used funding schemes for future research on the themes considered in the INSPIRATION project. The stakeholders have recognised the need for both national and European research funding, and in some cases also regional funding. National and European projects should deal also with global issues and challenges.

Possible sources of national funding include: the Academy of Finland, Finnish Technology Funder Tekes, Government working group for the coordination of research, foresight and assessment activities, sectoral funding from ministries and state administration as well as funding from cities, regional councils and regional Centres for Economic Development, Transport and the Environment. In some projects, funding has been successfully gathered from many different funders, ranging from cities to ministries.

Horizon 2020, European Regional Development Fund (ERDF) and European Innovation Partnerships (EIP) are important as European sources of funding. In addition, different sectors, such as the transport sector, have their own international funding networks. Also funding from programmes related to agriculture and rural areas have significance. Some stakeholder representatives hoped that regional development funds could be more than presently directed to research that is relevant in different regions.

R&I funding options collated for country:

Name	Research and Innovation funder	What and/or whom do they fund?	More info
Regional			
Cities and municipalites	studies with their own resources and sometimes with private or public parties	They can finance studies on issues relating to city development and environment.	
Regional councils	There are 18 regions in mainland Finland, and the Åland Islands. A regional council is the region's statutory joint municipal authority; every local authority must be a member of a regional council. The councils have two main functions laid down by law: 1) regional development and 2) regional land use planning.	Regional councils can finance projects relating to regional land use planning or certain theme e.g. climate change adaptation or low carbon society.	
Companies	studies with private or public parties	case specific / made-to-measure research	
Project based research	public and / or private parties	Ad hoc / made-to-measure research	

The Finnish Cultural Foundation - Regional funds	Foundation's 17 regional funds concentrate on promoting and developing the arts, the sciences, and other fields of endeavour at the regional level through annual grants and awards. In addition, regional funds also organise their own events and develop and manage their own projects.	Science grants are primarily intended for dissertations and post-doctoral research. Priority is given to applicants born or residing in the region, work carried out in the region, work relevant to the region and cultural projects that are particularly important to the region.	https://skr.fi/en/finnish-cultural-foundation/regional-funds
National level			
Academy of Finland	An agency within the administrative branch of the Finnish Ministry of Education, Science and Culture.	It funds high-quality scientific research and people's working at universities and research institutes in Finland. Funding is directed to **Academy Programmes** with a view to directing research and allocating research funding to fields that are considered of key importance in terms of the regeneration of science and the foresighting of future research needs. A major emphasis in Academy Programmes is on multi- and transdisciplinarity approaches as well as international cooperation. An Academy Programme is a thematic, target-oriented and coordinated body of research projects that are provided with funding for at least four years. In 2015, the Academy funds 13 Academy Programmes.	http://www.aka.fi/en/ http://www.aka.fi/en/research-and-science-policy/academy-programmes/
Academy of Finland / Strategic reseach funding	An agency within the administrative branch of the Finnish Ministry of Education, Science and Culture. The projects to be funded are selected by the Strategic Research Council (SRC), which consists of a chair and eight members appointed by the Finnish Government.	The funding **instrument for strategic research** is designed to support long-term and programme-based research.	http://www.aka.fi/en/research-and-science-policy/strategic-research-funding/
Academy of Finland / Key project funding	An agency within the administrative branch of the Finnish Ministry of Education, Science and Culture. The funding decisions will be made by a subcommittee appointed by the Academy Board.	The objective of the Programme of the current Finnish Government concerns a 'key project' aimed at strengthening the cooperation between higher education institutions and business life to bring innovations to the market.The funding is designed to support the strengthening of the quality and impact of research. It promotes competence-based growth, establishment of international centres of excellence and active collaboration with end-users and beneficiaries of research. The funding can be applied for by researchers who have been principal	http://www.aka.fi/en/research-and-science-policy/key-project-funding-by-the-academy-of-finland/

		investigators for Academy-funded research projects in 2015 or by the end of the call in 2016. Also eligible are researchers who in 2015 or by the end of the call have received funding from a foreign or international funding agency similar to the Academy.	
Government working group for the coordination of research, foresight and assessment activities	The Government working group for the coordination of research, foresight and assessment activities (TEA Working Group) is a body facilitating cooperation and exchange of information between the Finnish ministries. It aims to strengthen horizontal monitoring of research, foresight and assessment activities, improve the information base for decision making and develop new ways of distributing information on research, foresight and assessment activities to decision makers and society at large. The group serves as the collective contracting authority for the coordination of research, foresight and assessment activities.	As part of Government's Comprehensive Reform of State Research Institutes and Research Funding, the Government annually adopts a plan for analysis, assessment and research in support of its decision making to steer studies and research towards specific priority areas selected by the Government. On the 2016 plan for analysis, assessment and research consists of eight main elements and of 56 themes for analysis, assessment and research e.g.: Wellbeing and health and Bioeconomy and clean solutions. The studies and research projects will be put out to open tender. The most recent application period was on 7 December 2015 - 18 January 2016.	http://vnk.fi/en/government-working-group-for-the-coordination-of-research-foresight-and-assessment-activities# http://vnk.fi/documents/10616/1034423/Government+plan+for+analysis%2C+assesment+and+research+in+support+of+decision+making.pdf/389a9aa6-4bd6-493c-90bf-e89d7b8b4009
Tekes – the Finnish Funding Agency for Innovation	Publicly funded expert organisation for financing research, development and innovation in Finland. It finances wide-ranging innovation activities in research communities, industry and service sectors.	Tekes provides innovation funding for companies, research organisations, and public sector service providers. Its' main target group consists of SMEs seeking growth in internationalisation. Companies can use funding for R&D, business and organisational development, and in planning for global growth. Universities, educational institutes, and research units are eligible for Tekes research funding for high-quality research activities that generate new business opportunities for Finnish companies. Public service providers such as towns and cities, municipalities, and hospital districts can use Tekes funding to develop high-quality services, organisational management, and in the implementation of public sector projects.	http://www.tekes.fi/en/tekes/ http://www.tekes.fi/en/programmes-and-services/tekes-programmes/

Ministry of Agriculture and Forestry	At the Ministry of Agriculture and Forestry, the core task of research and development activities is to proactively produce knowledge, expertise and innovations to support decision-making, promote the competitiveness of economic activities and ensure the sustainable use of renewable natural resources.	The **Ministry's research and development appropriation** is used, in particular, to fund research, development and study projects that support planning, foresight, monitoring and impact assessment activities concerning policy measures and legislation. **The Development Fund for Agriculture and Forestry (Makera)** grants R&D funding for research activities that benefit the agri-food sector across a broad front. The main focus is on research concerning the sustainable development of the profitability and competitiveness of livelihoods.	http://mmm.fi/en/research-and-development/funding-for-projects
Ministry of The Environment	The Ministry of the Environment is responsible for preparing matters to be submitted for consideration by the Government and Parliament, such as matters concerning communities, the built environment, housing, biodiversity, sustainable use of natural resources and environmental protection. The ministry aims at using the produced information in its operations as efficiently and systematically as possible.	The Ministry of the Environment finances research, foresight, assessment and analysis (TEAS) activities that serve governance by supporting: forecasting of operations, preparation, development and implementation of national and international environmental policy and legislation and decision-making.	http://www.ym.fi/en-US/The_Ministry/Financing_and_subsidies/Funding_for_research_and_development
Ministry of Employment and the Economy	The Ministry of Employment and the Economy (MEE) is responsible, within its purview, for the availability of sufficient financial resources to both domestic-supply and export enterprises with regard to the enterprises' needs in general and any restrictions imposed by the international financial and legal framework.	the MEE controls and manages the regional Centres for Economic Development, Transport and the Environment with regard to the subsidies these grant for enterprises' use to develop their operations. The Ministry of Employment and the Economy is responsible for implementing the EU's regional development and social fund programmes in Finland. In respect of the related issues, it also steers other actors participating in such work.	http://www.tem.fi/en/enterprises/financing http://www.tem.fi/en/regional_development
Ministry of Transport and Communication	The Ministry's responsibilities include transport systems and networks, transport of people and goods, traffic safety, and issues relating to climate and the environment.	Ministry of Transport and Communication finances research, foresight, assessment and analysis (TEAS) activities that serve governance by supporting preparation and implementation of transport policies and legislation and decision-making.	http://www.lvm.fi/en/the-ministry

Finnish Transport Agency	The focus of research and development at the Finnish Transport Agency lies on finding new innovations for traffic and transport infrastructure and developing the Finnish Transport Agency's operations. Research functions focus on the following research themes: evolving data-based mobility services, intelligent infrastructure and a well-functioning transport system, effective transport infrastructure management and life cycle management, and adjustment to climate change and climate change mitigation.	The interdisciplinary research and development work is carried out in cooperation with other actors in the field.	http://www.liikennevirasto.fi/web/en/research-and-development
Finnish Transport Safety Agency (Trafi)	Trafi develops the safety of the transport system, promotes environmentally friendly transport solutions and is responsible for transport system regulatory duties.Research and development funding supports Trafi's operations. Funding is allocated to following themes: diminishing environmnental impacts of transport, improvement of transport safety, digitalization and new services in transport, state and actors of transport system and development of Trafi's activities.	The interdisciplinary research and development work is carried out in cooperation with other actors in the field.	http://www.trafi.fi/en/about_trafi
Partnership Agreement for Finland 2014-2020	The PA covers four funds: the European Regional Development Fund (ERDF), the European Social Fund (ESF), the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF). The Centres for Economic Development, Transport and the Environment (ELY Centres) play a significant role as authorities granting EU funding and as drivers of regional development. The ELY Centres come under the administrative branch of the Ministry of Employment and the Economy.	Sustainable growth and jobs 2014 - 2020 - Finland's **structural funds** programme' has five priority axes and 13 specific objectives. Applicants can be educational establishments, associations, research institutes, municipalities, companies and other incorporated societies. In t**he Rural Development Programme (RDP)** for mainland Finland the largest part of funding is targeted to agricultural areas with natural constraints (ANC). In this context, Finland aims to have 83% of its agricultural area under contracts of agri-environment-climate measure and will provide more funds for organic farming. Funding is available for developing enterprises in rural areas and among others development projects relating to the state of the environment, services and ja pleasant environment.	https://www.rakennerahastot.fi/web/en#.Vp5X9GOCXg4 http://ec.europa.eu/agriculture/rural-development-2014-2020/country-files/fi_en.htm

The Finnish Energy	The Finnish Energy (ET) is a sector organisation for the industrial and labour market policy of the energy sector. It represents companies that produce, acquire, transmit and sell electricity, district heat and district cooling and offer related services.	Environmental pool is a cooperation agreement on energy sector. It coordinates environmental research on energy sector, launches necessary projects and intensify the use of research- and development resources among pool partners. Finance is available to wide variety of issues like climate change prevention, corporate social responsibility on energy sector, future environmental solutions and -technologies. In 2016 priorities are e.g. interaction in society and environmental communication supporting decisions, biomass sustainability - northern point of view, circular economy and resource efficiency. Finance can be applied by every one continuously.	http://energia.fi/en http://energia.fi/energiateollisuus/tutkimus/ymparistopooli (only in Finnish)
SITRA	SITRA is a fund operating directly under the Finnish Parliament. Its' decision-making processes are tied to parliamentary systems and administration includes a Supervisory Board, Board and President. Administration and accounts are audited by accountants appointed by the Parliament.	Sitra provides funds for surveys, forward-thinking activities, experiments, and shared strategy processes that promote well-being and are ecologically and socially sustainable. Project funding must be related to Sitra's themes or key areas. Sitra does not provide funds for academic research projects, dissertations, or commercial research and development projects. There is no fixed application period or form for funding applications. Take your idea for a project directly to one of our contact persons.	http://www.sitra.fi/en/about-sitra/project-funding
Maj ja Tor Nessling Foundation	Foundation supports scientific research concentrating on environmental problems and their solutions.	The Foundation emphasizes on environmental research that is solution-oriented and promotes collaboration. Grants for research projects can be applied for PhD- or Post doctoral projects. The applicant is the PhD- or post doctoral researcher her-/himself. Research grants are only awarded to researchers with a higher academic degree or doctoral degree. Grants for communication of scientific environmental information or other projects that support the aims of the Foundation can be applied by private persons, communities or organizations.	http://www.nessling.fi/grants-2/?lang=en

K.H. Renlund Foundation	Foundation enhances the inventories and utilisation of ores and useful minerals and technically useful rock-, soil- and groundwater resources. Foundation also sponsors technical innovations on sectors of mineralogy and geology as well as geologically oriented environmental projects.	Not mentioned on website.	http://web.abo.fi/stiftelser/renlund/historia_ja_tarkoitus.shtml (only in Finnish)
Kone foundation	It is an independent and unaffiliated organisation, which e.g. awards grants to promote academic research, culture, art and the popularisation of research. Besides regular funding rounds, foundation organizes thematic grant calls, the purpose of which is to draw attention to current themes in academic and cultural life.	Grants are awarded for research in the humanities, social sciences, for environmental research and for artistic research. Grants are also awarded for popularising research and for art and culture projects.	http://www.koneensaatio.fi/en/tuemme/formsofsupport/
Maa- ja vesitekniikan tuki (Support of soil- ja water technics	Association that supports water technics and environmental technics relating to it and also soil protection. It can support arranging of education, give grants to researchers, institutes and universities, support study- and congress travels, finance research and research publications.	Private persons, work- and research groups and communities can apply for grand.	http://www.mvtt.fi/fi/etusivu/ (only in Finnish)
Water Utilities Development Fund	Finnish Water Utilities Association (FIWA) is the co-operation and member association of the Finnish water and wastewater utilities. Association has a development fund and all the ordinary members of the association are also fund members. The annual fee is 0,1 cent per sold water cubic metre. All the funds without deductions are used for development projects.	It supports research and development projects which are relevant to develop utilities. Two kind of projects are financed: projects in origin of specific water and wastewater utility and projects of open application according the area of focus (twice a year).	http://www.vvy.fi/in_english
Jenny and Antti Wihuri foundation	The Jenny and Antti Wihuri Foundation is a non-profit cultural foundation that supports activities of a broad spectrum. The Foundation fulfills its purpose among others by distributing grants and prizes in the fields of science, art and other societal activity.	Private persons, working group and communities (e.g. non-profit association and cooperative) can apply for grand for scientific or artistic work and project in field of science, art and culture. Grand in science priorities preparation of doctoral thesis and scientific work after that (person or research group).	http://wihurinrahasto.fi/?lang=en
The Finnish Cultural Foundation	Private trust dedicated to promoting art, science, and other fields of intellectual and cultural endeavor in Finland. The Foundation provides grants from a central fund and 17 regional funds.	Grand can be applied by private individual for their own work and/or for expenditures of a project, a working group for a group member's work and/or for expenditures of a project and a registered legal entity (such as association or cooperative) for expenditures of a project. The	https://skr.fi/en

		majority of the grants are awarded to private persons and working groups.	
Fundamental research of universities	Most of this research is financed by society (public money)	Basic research and applied research, needed to maintain knowledge base	
Research of research institutes	Partly financed by society (goverment budgeting) and partly project-based	Research institutes	
3rd flow of funds (universities and research institutes)	Increasing source of finance, public, private, industries and government	Project oriented research	

Experiences of funding schemes

The alignment and interfaces of different funding systems were raised by the stakeholders as a matter to consider more carefully when preparing future funding agendas. Several separate aims were seen to be related to the setting of research targets. It was considered useful to start from societal challenges rather than from interests of a single industry or promotion of only business activities. In addition, action-based research carried out with stakeholders was seen increasingly important.

Competition for research funding was considered by the stakeholders to be getting more intense. Preparing applications consumes considerable resources, which can decrease the efficiency of research work in the large scale. The profitability of large project calls was questioned due to the huge amount of wasted work done for abandoned project applications. Separate funding for preparation of research proposals was suggested.

Short-term project world and hard competition may also reduce the interests of potential researchers to enter the researcher career. That's why the creation of "science career paths" were suggested for young researchers.

The research calls of EU where seen to be too all-embracing entities aiming to support a selected policy. Interests of a single country may not be interesting in the European level, which is a problem, if the proportion of European funding of all funding is increasing. This also stresses the participation in the preparation and evaluation of EU research calls. There is also a need for national and regional sources of funding, so that projects can be targeted at research questions that are relevant from national point of view.

Developing funding mechanisms and increasing their effectiveness

According to stakeholder representatives, research calls should be more often carried out in stages, with more accurate contents only in later stages. This would decrease the spending of too much efforts on failed proposals. It also was suggested that well rated proposals that still didn't receive funding could be gathered to a project bank for some time, and when there is a need and funding opportunity for new research projects, some funding might be directed to already ready proposals in that project bank.

It was seen useful to investigate how research funding is organised outside Europe. In the USA, systems may not be as bureaucratic as in EU.

The productivity of research funding needs improvements. Stakeholder representatives saw that basic research is most efficient to organise on the basis of budget funding. Administration and reporting in research projects was suggested to be lightened, so that resources would be directed to research, not project paper work. Compensation of project costs would be good to take place as real-time as possible. Long delays in payments may prevent participation of some stakeholders in certain calls and projects. Professional support personnel are needed to help the tasks of researchers in the projects.

Stakeholder representatives expressed worries over the accumulation of funding to a limited number of state-of-the-art projects and organisations, leaving other actors that have important tasks e.g. in the education without funding. While many EU-funded projects are relatively large, the need for smaller projects and consortia was also expressed. Smaller projects could be easier to set up and could produce results more quickly.

Merging public and private funding was seen necessary by the stakeholders. Private investments to research foundations could be favoured in taxation. The interviewed stakeholder representatives pointed out that small and medium-sized enterprises have limited resources for research and development, approximately within the range of 10 000–100 000 euros. That is why combined funding models need to be preferred. Big companies often have their own research units, but their research results are usually not openly published.

One way to channel private funding to research could be through foundations or funds, where both private and public sector could invest. The foundation or fund could offer small and medium-sized companies a chance to support the research that serves them. Public fundraising was also mentioned as an opportunity.

Some stakeholder representatives held the opinion that research calls shouldn't be too narrowly focused to allow space for new innovations. Others thought that when research funding is getting more limited, research should be more focused. Focusing the topics could also help to get concrete results.

New working practices were suggested for laboratories, sample taking and data management. New types of services could be piloted and productised.

It was also pointed out that there is a need to get information of unsuccessful projects, so that same mistakes wouldn't be repeated in the future.

There was also noticed to be a need for an independent body without any connections to businesses or other interest groups to take responsibility for research funding allocation. A new “Science Ministry” was suggested to be founded for this type of coordination activities.

5.5.2 Gaps in financial resources for research

Soil and land as a resource was thought by many stakeholder representatives to be partly neglected topic in large scale research agendas. Many experts expressed worries over the funding of basic research, monitoring and maintenance of data pools, which were regarded as a publicly funded task. Soil monitoring is lacking permanent funding. Applied research can more often receive funding from the users of research results. However, it was noted that applied research is often based on basic research, monitoring and databases. New study- and analysis methods need to be developed to create more cost efficient solutions for monitoring, but it is difficult to find financier for the task.

Meta-analysis based on already gathered results, such as synthesis of existing monitoring data, was noted to deserve more attention. Integrated approaches combining different fields of expertise e.g. in a river basin context were seen to be appreciated today, but they would require also cross-sectoral funding and co-operation.

Big financial values were seen to be related to the built environment and industries relying on land and soil. According to interviewed stakeholder representatives, the significance of land and soil issues for these values should be more explicitly argued to organise sufficient funding for relevant research questions.

Stakeholder representatives remarked that short-term and applied research activities have become more common during last years. Long-term basic research has lost its resources, which was seen problematic by the research institute representatives. Also high quality basic research was seen to be needed to support decision-making in the future.

5.6 Annexes

Annex I: NKS interviews in Finland

Date of interview	Organisation	Interview	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
17-06-15	City of Helsinki, City Planning Department	Kaarina Laakso	x	x		x										x
18-06-15	Association of Finnish Local and Regional Authorities	Miira Riipinen, Ulla Hurmeranta	x	x		x							x			x
29-10-15	Infra Contractors Assiociation in Finland	Eija Ehrukainen		x					x				x			x
29-10-15	City of Helsinki, Public Works Department	Mikko Suominen	x	x		x							x	x		x
04-11-15	University of Helsinki, Department of Food and Environmental Sciences	Markku Yli-Halla			x		x						x			
06-11-15	Finnish Transport Agency	Arto Hovi, Soile Knuuti, Tuula Säämänen	x	x		x										x
06-11-15	University of Helsinki, Department of Geosciences and Geography	Kirsti Korkka-Niemi			x		x						x	x	x	
09-11-15	Finnish Water Utilities Association	Riina Liikanen, Osmo Seppälä		x							´x				x	
13-11-15	Geological Survey of Finland	Ossi Ikävalko, Jaana Jarva			x		x						x	x	x	x
17-11-15	Ministry of Agriculture and	Maisa Tapio-Biström,	x	x		x							x	x	x	x

	Forestry	(agriculture), Niina Riissanen (forestry), Jaana Kaipainen (climate change adaptation, soils), Ville Keskisarja (waters), Elina Nikkola (research)														
19-11-15	Natural Resources Institute Finland	Kristiina Regina			x		x						x			x
23-11-15	Ministry of Employment and the Economy	Kirsti Loukola-Ruskeeniemi	x	x		x										x
25-11-15	Ministry of Environment	Anna-Maija Pajukallio	x	x		x							x	x	x	x
26-11-15	Natural Resources Institute Finland	Tiina M. Nieminen			x		x						x			

Annex II: NKS participants in the national workshop in Finland

Organisation	Participant	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
Natural Resources Institute Finland	Antti-Jussi Lindroos			x		x						x			
Golder Assiciates Oy	Erkki Paatonen		x				x					x			
Finnish Consulting Group	Helena Ylinen		x				x								x
The National Board of Antiquities	Marianna Niukkanen	x			x							x			x
Geological Survey of Finland	Ossi Ikävalko			x			x					x			
The Centre for Economic Development, Transport and the Environment of Pirkanmaa	Satu Honkanen		x		x							x			
Finnish Consulting Group	Arto Itkonen		x				x								x
The Regional Council of Häme	Harriet Lonka		x		x							x		x	
Aalto University	Jaana Sorvari			x		x						x			
The Finnish Water Utilities Association	Osmo Seppälä		x					x		x				x	
The National Board of Antiquities	Petri Halinen	x			x										x

Ramboll	Teppo Moisio		x				x					x		x	
Natural Resources Institute Finland	Tiina Nieminen			x		x						x		x	
The Villages of Central-Pohjanmaa	Esa Erkkilä		x						x	x					x
Geological Survey of Finland	Jaana Jarva			x		x						x			
Natural Resources Institute Finland	Kristiina Regina			x		x						x			
University of Helsinki / Cooperative Bionautit	Marja Tuomela			x		x	x					x			
Ministry of Environment	Merja Laitinen	x			x										x
The soil reseach and remediation society	Raakel Jaloniemi		x					x		x		x			
Finnish Consulting Group	Risto Tilli		x				x					x			x
Infra Contractors Assiociation in Finland	Eija Ehrukainen		x					x				x			
Natural Resources Institute Finland	Hannu Fritze			x		x						x			
Populus Group Oy	Kim Yrjälä			x		x	x					x			
Lemminkäinen Infra	Lasse Vilhunen		x					x				x			

Pöyry	Maarit Korhonen		x				x					x			x
Geological Survey of Finland	Paavo Härmä			x		x						x			
Baltic Sea Action Group	Eija Hagelberg		x						x	x		x			x
Aalto University	Eeva Säynäjoki			x		x									x
Natural Resources Institute Finland	Hannu Ilvesniemi			x		x						x			
University of Vaasa	Heli Siirilä			x		x									x
Ministry of Environment	Nunu Pesu	x			x										x
The Villages of Länsi-Uusimaa	Pirkko Kaskinen		x						x	x		x			

Annex III: Documents used for the FI desk study

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Annex IV: National workshop programme (in Finnish)

MAANKÄYTTÖ JA MAAPERÄ TUTKIMUSKOHTEENA

TYÖPAJA JA VERKOSTOITUMISTILAISUUS

19.-20.11.2015

Suomen ympäristökeskus

kokoushuone Tervapääsky

Mechelininkatu 34a, Helsinki

Suomen ympäristökeskus SYKE järjestää työpajan ja verkostoitumistilaisuuden, jonka aiheena ovat maankäyttöön ja maaperään liittyvät tutkimustarpeet. Työpaja on osa EU-rahoitteista INSPIRATION-hanketta, jossa tunnistettujen tietotarpeiden perusteella laaditaan eurooppalaista strategista tutkimusohjelmaa. Tarkoituksena on, että tutkimusohjelma vaikuttaa tulevaisuudessa tutkimusrahoituksen suuntaamiseen.

Maankäyttöä ja maaperää lähestytään työpajassa hyvin monesta eri näkökulmasta ja asiantuntemusalueesta käsin. Tarkastelun kohteina ovat esimerkiksi maa-alueiden käyttö rakentamiseen ja elinkeinotoimintaan, maankäytön suunnittelu, maaperän laatu ja suojelu, maa- ja kiviaineshuolto, maisemanhoito, pilaantuneiden maa-alueiden käyttö ja pohjavesien suojelu.

Työpajaan on kutsuttu keskeisten sidosryhmien edustajia: tiedon loppukäyttäjiä eri toimialoilta, tutkimusrahoittajia ja tiedontuottajia.

Työpajassa pohditaan, mitkä ovat tällä hetkellä pahimpia tiedon puutteita ja millaista uutta tutkimustietoa tarvitaan, jotta voidaan ratkaista yhteiskunnallisia haasteita sekä tuottaa uusia innovaatioita ja liiketoimintamahdollisuuksia. Lisäksi keskustellaan siitä, miten tutkimustieto parhaiten välittyy päätöksentekoon ja käytännön toimintaan sekä millaisia tutkimuksen rahoitusjärjestelmiä tarvitaan.

Tilaisuus tarjoaa mahdollisuuden tutustua eri alojen osaajiin ja hakea uudenlaisia yhteistyömahdollisuuksia. Tavoitteena on synnyttää maankäyttö- ja maaperäkysymyksiin keskittyvä verkosto, jonka piirissä voidaan osaamista yhdistämällä ja tietotarpeisiin vastaamalla löytää uusia ratkaisuja.

Lisätietoja:

Inspiration-hankkeen Suomen yhdyshenkilö: erikoistutkija Antti Rehunen, Suomen ympäristökeskus

sähköposti: etunimi.sukunimi@ymparisto.fi, puhelin: 0295 251 550

INSPIRATION-hankkeen esittely: http://www.inspiration-h2020.eu/

INSPIRATION-hanke Suomessa: http://www.inspiration-h2020.eu/page/finland

OHJELMA

Torstai 19.11.2015 Teema: Tutkimustarpeet

12.00-12.30 Salaattilounas

12.30-12.50 Tilaisuuden avaus ja osanottajien esittäytyminen

12.50-13.10 INSPIRATION-hankkeen esittely

13.10-13.40 Poimintoja hankkeessa toteutetuista haastatteluista ja kirjallisuusselvityksestä

13.40-14.10 Keskustelukierros tutkimusaiheista

14.10-14.30 Kahvi

14.30-16.00 Tutkimustarpeiden kartoitus Learning cafe -menetelmän avulla

- tutkimusaiheet: maa ja maaperä resurssina (25 min.)
- tutkimusaiheet: yhteensovittaminen maankäytössä (25 min.)
- tiedon käyttö päätöksenteossa (20 min.)
- rahoitusmahdollisuudet (20 min.)

16.00-16.10 Tauko

16.10-16.40 Yhteenveto Learning cafe-työskentelystä ja yhteiskeskustelu tutkimustarpeista

16.40-17.00 Työpajan päätössanat ja keskustelu maankäyttö- ja maaperäkysymyksiin keskittyvästä verkostosta

17.00-21.00 Illallinen ja vapaata keskustelua

Perjantai 20.11.2015 Teema: Ehdotukset tutkimusohjelmaan

09.00-09.30 Päivän avaus, esittäytyminen ja hankkeen esittely

09.30-10.20 Näkökulmia maankäyttö ja maaperä -teeman tutkimukseen ja tietopohjaan

Riina Antikainen, SYKE; Ossi Ikävalko GTK; Antti Rehunen SYKE; Eeva Säynäjoki Aalto-yliopisto; Petri Shemeikka & Anna Strandell, SYKE

10.20-11.30 Tutkimusohjelmaan tehtävien ehdotusten pohdinta learning cafe -menetelmän avulla

11.30-12.00 Yhteenveto ja keskustelu Learning cafe-työskentelyn pohjalta

12.00-12.15 Keskustelu yhteistyön tiivistämisestä

12.15-13.00 Lounas SYKEn alakerran ravintolassa

6. France

Report by Marie-Christine Dictor, Samuel Coussy, Valérie Guerin, Corinne Merly

6.1 Executive summary

6.1.1 English version

At the end of discussions, revealing more than 60 ideas of research programmes, priority is given to societal challenges: Ensure secure supplies for water resource, contribute to food security and food safety and ensure an efficient use of natural resources. Nevertheless, transverses questions in several challenges show a wish to concentrate on functions of soil and on multifunctional services which they produce, with a need to sensitise the society in these functions and a need of indicators / data depositories to evaluate soil functional type which can't be generic due to soil diversity in France

The questions of research raised both during individual or collective interviews and during the national workshop were gathered in 5 great priority sets of themes:

i. Allocation of land: A real need for tools for arbitration including indicators of city planning (conflicts between wellness and services, like the food production) in low density areas, for the ecological state or quality standards of the soil, the maps of vulnerabilities in link with the use of the soil for a better management of the contaminated sites, the development of tools for the management of the urban soils to be integrated in the documents of territorial planning, the creation of observatories of the urban soils allowing the follow-up of their temporal evolution, the development of evaluation methodologies of the effectiveness of treatment techniques including the concept of real risk vs possible hazard.

ii. Agricultural production and climate: for a better apprehension in the management of the soils on various scales, the emergent subjects are to redefine the methodology of the determination of the useful water reserve of the soils under various pedoclimatic conditions; to build a soil mapping on a scale compatible with a decision making on the local level, predictive scenarios of evolution building,…); for a better management of storage capacities and transfer of the substances in the soils in link with the monitoring of long-term experimental sites, the raised problems relate to organic carbon fluxes, the contributions of organic nitrogen and phosphorus, the substitutes of phytosanitaires products, nanoparticles; the need of a new agricultural model with the development of alternative practices, taking into account of the macro- and micro-biodiversity in soil management, a better knowledge of processes and factors controlling carbon fluxes in contrasted landscapes.

iii. Knowledge on the functions, distribution, and evolution of the soils: distribution and evolution of the soils in an integrated predictive approach (model integrating the various compartments of the critical zone); knowledge on the health risk of the new molecules present in groundwaters; development of sites of demonstration of innovating technologies and observatories with the long-term monitoring of the critical zone (new tools/methods of follow-up, definition of a set of generic biogeochemical parameters) in a space and temporal dynamics; the development of a network multi-actors for the data collections on the soils.

iv. Monitoring on soil: with technological as well as methodological developments expected with capitalization of measure tools for a better knowledge of genetic inheritance, growth of the plants and its requirements in nutrients, soil conditions and its evolution, characterization and monitoring of the effects of the restoration of the system soil-water-sediments contaminated (in situ sensors, bioaccessibility / biodisponibility).

v. Soil functions and services: the development of a methodology of evaluation of the soil functions and services associated in the agricultural, forest ecosystems,…; an integrated modeling in order to optimize the management of the landscapes in link with the agrosystems; the refonctionnalisation of the degraded sites according to their urban, suburban or rural future use, the need for reconciling the impacts on the wetlands and the associated ecosystemic services; the development of strong indicators to evaluate the impact of the practices with an objective of low impacts on the soils under various pedoclimatic conditions.

The improvement of the use of knowledge could be done on 2 levels: (i) on the level of a project by implying the stakeholders (including end-users) over the duration of the project (from the offer until the operational stages), by encouraging the building of multi-actors projects and by strongly associating the civil society, (ii) on the level of a program, the creation of networks with multi-actors must be encouraged with the development of management tools of information and knowledge in order to facilitate interface between the scientific knowledge, the policies and the civil society (specific tools/organizations). Innovating methodologies and funding mechanisms allowing an approach bottom-up must be developed. A particular point relates to the funding of the monitoring of the sites of observation and demonstrations on the long-term which must be secured. Places of meetings/debates between the various actors of a territory are necessary in order to lead to a common vision of the soil and in agreement with the development of the territory in the present and the future.

The national funding as well as the main European funding, in the opposite to the regional funding, are well-known by the interviewee. Among the proposals to increase the added-value in R&I and an increased accessibility towards the end-users, the set-up of demonstrators making possible the validation of technologies was mainly quoted as well as immersions of researchers in the companies for a better adequacy between the need in R&I for the companies (short-term) and the capacity of research to answer. Nevertheless, some sets of themes (soil-sediment-water system in an integrated approach, interface health-environment, pedogenesis, urban development) are not financed at the present time on high scales of technology readiness level. Funding of actions to the long-term (higher than 3 years) was stated in a recurring way during interviews and during the national workshop, in particular for the observatories long-term with the implication of multidisciplinary teams.

6.1.2 French version

A l'issue des entretiens, révélant plus de 60 idées de programmes de recherches, la priorité est donnée aux défis sociétaux suivants : sécuriser l'approvisionnement à la ressource en eau, contribuer à la sécurité et sureté alimentaire et assurer une utilisation efficiente des ressources naturelles. Néanmoins, des questions transverses à plusieurs défis font apparaître un souhait de se concentrer sur les fonctions des sols et sur les services multifonctionnels qu'elles produisent, avec un besoin de sensibiliser la société civile à ces fonctions.

Les questions de recherche soulevées lors des entretiens individuels ou collectifs ainsi que lors de l'atelier national ont été regroupées en 5 grandes thématiques prioritaires :

i. Affectation des terres : Un réel besoin d'outils d'arbitrage incluant des indicateurs de planification urbaine (conflits entre bien-être et les services, comme la production alimentaire) en zone de faible densité, des critères de qualité des sols ou d'état écologique, des cartes de vulnérabilités en lien avec l'usage des sols pour une meilleure gestion des sites contaminés, le développement d'outils pour la gestion des sols urbains à intégrer dans les documents de planification territoriale, la création d'observatoires des sols urbains permettant le suivi de leur évolution temporelle, le développement de méthodologies d'évaluation de l'efficacité des techniques de traitement incluant la notion de risque réel vs risque potentiel.

ii. Production agricole et climat : pour une meilleure appréhension dans la gestion des sols à différentes échelles, les sujets émergents sont de redéfinir la méthodologie de la détermination de la réserve utile des sols dans différentes conditions pédoclimatiques ; de bâtir une cartographie des sols à une échelle compatible avec une prise de décision au niveau d'une localité, scénarios prédictifs d'évolution, …) ; pour une meilleure gestion des capacités de stockage, de transfert des substances dans les sols en lien avec le suivi à long-terme de sites, les problématiques soulevées portent sur le carbone organique, les apports en azote et en phosphore, les substituts aux produits phytosanitaires, les nanoparticules,…; l'élaboration d'un nouveau modèle agricole avec le développement de pratiques agricoles alternatives, la prise en compte de la biodiversité macro- et microbienne dans la gestion des sols, les connaissances accrues sur les processus et facteurs contrôlant les flux de carbone dans des paysages contrastés).

iii. Connaissances sur les fonctions, la distribution, l'évolution des sols : la distribution et l'évolution des sols dans une approche prédictive intégrée (modèles intégrant les différents compartiments de la zone critique) ; connaissances sur le risque sanitaire des nouvelles molécules présentes dans les eaux souterraines ; développement de sites de démonstration de technologies innovantes et d'observatoires à long-terme de la zone critique (nouveaux outils / méthodes de suivi, définition d'un jeu de paramètres biogéochimiques génériques) dans une dynamique spatiale et temporelle ; le développement d'un réseau multi-acteurs pour une centralisation des données sur les sols.

iv. Suivi et métrologie appliquée aux sols : avec des développements technologiques et méthodologiques attendus d'outils de mesure et de capitalisation des connaissances du patrimoine génétique, de la croissance des plantes et de ses besoins en nutriments, des conditions du sol et de son évolution, de caractérisation et de suivi des effets de la restauration du système sol-eau-sédiments contaminé (capteurs in situ, bioaccessibilité / biodisponibilité).

v. Fonctions des sols et services associés : le développement d'une méthodologie d'évaluation des fonctions du sol et services associés dans les écosystèmes agricoles, forestiers,… ; une modélisation intégrée afin d'optimiser la gestion des paysages en lien avec les agrosystèmes ; la refonctionnalisation des sites dégradés en fonction de leur usage urbain, périurbain ou rural ; la nécessité de concilier les impacts sur les zones humides et les services ecosystémiques associés ; le développement des indicateurs pour évaluer l'impact des pratiques avec un objectif de limitation des impacts sur le sol sous différentes conditions pédoclimatiques

L'amélioration de l'utilisation de la connaissance pourrait être réalisée à 2 niveaux : (i) au niveau d'un projet en impliquant les parties prenantes (dont les utilisateurs) sur la durée du projet (depuis l'offre jusqu'aux étapes opérationnelles), en encourageant le montage de projets multi-acteurs et en associant fortement la société civile, (ii) au niveau d'un programme, la création de réseaux multi-acteurs doit être encouragée avec le développement d'outils de gestion de l'information et du savoir afin de faciliter l'interface entre la connaissance scientifique, les politiques et la société sous forme d'outils / organisations spécifiques. Des méthodologies et des mécanismes de financements innovants permettant une approche bottom-up doivent être développés. Un point particulier concerne le financement du suivi des sites d'observation et démonstrations sur le long terme dont le financement doit être pérennisé. Des espaces de rencontres / débats entre les différents acteurs d'un territoire sont nécessaires afin d'aboutir à une vision du sol commune et en accord avec le développement du territoire présent et futur.

Les financements nationaux ainsi que les principaux financements européens, contrairement aux financements régionaux sont bien connus de personnes interrogées. Parmi les propositions pour augmenter la valeur ajoutée en R&I et une accessibilité accrue vers les utilisateurs finaux, la mise en place de démonstrateurs permettant de valider des technologies a été majoritairement citée ainsi que des immersions de dans les entreprises pour une meilleure adéquation entre le besoin des entreprises (court –terme) et la capacité de la recherche à y répondre. Néanmoins, certaines thématiques (la composante sol-sédiment-eau dans une approche intégrée, l'interface santé-environnement, pédogénèse, développement urbain) ne sont financées pas à l'heure actuelle sur des échelles TRL élevées. Le financement d'actions à long-terme (supérieur à 3 ans) a été évoqué de manière récurrente lors des entretiens et lors de l'atelier national, notamment pour les observatoires log-terme avec l'implication d'équipes pluri-disciplinaires.

6.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for France. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation”. In France, 25 NKS were interviewed. In France, In addition to one-to-one interview, two workshops were carried out. One was organised as a phone conference (involvement of 3 persons). The 2 other ones were organised as workshops. The first one was undertaken in collaboration with the regional cluster “Axelera” (composed of researchers, end-users and regional policy makers) during their regular soil workgroup on soils held in September 2015. The second one was performed in October 2015 in collaboration with the research program “Pollusols” involving researchers, end-users on urban soils topic. Details on NKS are provided in Annex I. The desk study was based on documents as suggested by NKS. These are listed in Annex II.

The national workshop was held the 15&16 October 2015 in Paris. The agenda is provided in Annex III. Eighteen persons attend to the 2-day workshop (16 on the first day and the second day). Participants were divided into 4 groups according to their affiliation (end-users (2 x 4), researchers (4), funders / policy makers (4) for the first day of the NW. Each group discussed about the 4 following questions: (1) What are the challenges ahead for the soils?, (2) propositions of structuration of research subjects issued from the interviews, (3) Which tools and skills can we develop to link science and Policy?, (4) What are the ideal financing tools ?. For the second day, participants were divided into 3 mixed groups and each group brainstormed on the following 2 questions: (1) Integrated approaches in research in communicating between actors (researchers, policy makers, end-users, …) and in maximising resources? (2) How do you facilitate the link between State and regional authorities? Four additional interviews were performed to address the specific recommendations held during the national workshop.

The D2.5 in a draft version was sent to the interviewees and workshop participants for a validation of the content. Five of them report back to NFP with some comments that were included in the final version of the D2.5, mainly on the Chapter 2 Research and Innovation needs (2 funders, 2 researchers, 1 end-user).

6.3 Research and Innovation (R&I) needs

6.3.1 Societal challenges and needs

For the majority of the national actors interviewed (60 to 70%), the priority is given to the 3 following societal challenges:

- Ensure secure supplies for safe drinking water,
- Contribute to food security and food safety,
- Ensure efficient use of natural resource.

Then, societal challenges such as “contribute to climate change and societal adaptation”, “contribute to a healthy environment", “secure energy supply and distribution” and “reduce raw material and resource consumption” arrived in second importance during the conversations. It appears as well as the prioritization of certain societal challenges is different from a group of NKS of another one.

The relevance of the societal challenges was discussed and some of them were proposed. The question of soils deserves to be more visible and is transverse in the other challenges. Furthermore, the question of compatibility between challenges was approached: for example, food production vs. water resource protection. The notion of ecosystemics services and critical zone do not appear explicitly in the actual societal challenges and need to be more visible. The objectives of the sustainable development of the United Nations could be used as a reference: par example, “protect and restore soils” (obj 15), “live healthy” (obj 3).

During the national workshop, societal challenges have been prioritized differently according to participant typology: (i) for knowledge end-users, main societal challenges were related to secures risks due to pollution heritage en close link with soil use, need to heighten awareness of civil society to soil (soil heritage value, soil culture of soil respect,…), (ii) for researchers, the main societal challenge were related to climatic change and increased pressures on population migration, land allocation use conflict between energetic and non-energetic biomass production, , erosion degradation, water fluxes regulation, biodiversity, (iii) for the funders, importance of the objective zero degradation by 2030.

All participants agree on the importance to focus on soil functions more than soil services, with a need to sensitize civil society to theses soils functions and need of indicators / data depositories to evaluate soil functional type which can’t be generic due to soil diversity in France.

6.3.2 Topics / research needs to include in the SRA

Soil is a natural and non-renewable resource that must be protected and managed and is one of pillars of sustainable and multifunctional ecosystem management. A proper land and land-use management is one of condition to maintain functioning ecosystem meeting various expectations on long term period. Metropolitan France form a major ecological crossroad within 4 of the 5 main biogeographic zones of Western Europe: Atlantic, continental, Mediterranean and alpine, which place France as the most diverse country of European Union in front of Spain and Italy.

FR-1: Allocation of Land

The pressure on land increases in urban areas but also in rural zones. In France, the growth rate of artificialized soils between 2006 and 2012 is + 0.49% per year. It is significantly lower than the rate observed between 2000 and 2006 (+ 1.30% per year). In comparison, the population growth is 0.53% per year. The rural areas are more concerned by soil artificialization, because free space is more easily available. Between 2006 and 2012, more than 87% of newly artificialized territories were taken over agricultural soils. In 2012, agricultural soils represent 60% of the metropolitan area, vs 3% for artificialized soils. In 2006-2012, 1.2% of the territory has changed of use (0.8% in 2000 2006). The conversion and re-functionalization of artificialized soils is a more limited phenomenon (CGDD, 2015). In this context, the question of allocation of land is of particular interest. It involves important societal challenges such as concurrence on land use (e.g. biomass production for energy production vs food production), as well as the need of space for human development. For instance, the biomass production for energy sector represents about 60% of renewable energy in France, and should remain stable until 2020. This is the main sector of production of renewable energy according to the French Ministry of Ecology Phenomena linked to climate change (increase of pressure on land due to climate change and population migration) is also addressed by the question of allocation of land.

Specific research questions (following the conceptual model of INSPIRATION)

Demand

- - Increase in research type questions on landscape planning about trade-offs between wellbeing and cost of services in low density areas, carbon foot print of commuting, and more specifically for soil about trade-offs between wellbeing and food supply (it's cheaper to build settlements on flat areas, which are also those with the higher crop potential).

  Why: To answer to the huge demand from society for houses with garden in well-connected areas.

Natural capital

- Assessment of ecological state or soil quality by choosing specific criteria, in relation with French policy (law on biodiversity). Focusing on compensation structures.

  Why: Policy is emerging on this topic and not yet entirely validated by scientific studies.

Land management

- Management of contaminated sites with vulnerability soil map related to its use, re-functionalization of low contaminated sites, land use cartography at a relevant scale for local planners.

  Why: there is a need to make available planning tools at a local scale to address urbanism questions.

- Study and understand phenomena such as "land take" and "soil sealing" into order to prevent urbanisation (need for decision-making tools allowing to make judgements on the choices/actions).

Why: it is necessary to arbitrate between several potential land uses in a context of pressure on land.

- Better management of urban soils, with an integration of the specific objectives in strategic documents of territorial planning. Observatories adapted to different scales should allow carrying out the monitoring of urban soils. Other tools would be the promotion urbanization projects consuming less space, facilitated use of brownfields, implementation in appropriate fiscal tools and integration of the reuse of excavated land.

  Why: the main objective is to reduce urban sprawl and the net increase in soil artificialization.

Net impacts

- Develop evaluation methodology to compare the efficiency of treatment techniques, evaluate the real risk vs. potential risk of soil contaminated for the environment.

Why: this is a societal need because actual data from risk assessment studies on polluted sites are anxiety producing for the society.

FR-2: Agricultural production and climate

Agriculture plays an important role in the environmental evolution at a global scale; it contributes to GES emissions together to potential carbon storage. Numerous pressures such as pesticides use, fertilizers use, and tillage have an impact on soil and groundwater quality, on its productivity. Organic matter and in particular organic carbon improve soil fertility and its stability and contribute also to control atmospheric carbon emissions. In France, organic carbon content decrease of 9 % in agricultural soil due to ecosystems evolution, conversion of grassland to arable land, agricultural practices changes (CGDD, 2015). Agricultural practices such as tillage, affect mostly some microfauna and fauna classes (microscopic fungi, earthworms) which are essential to soil functioning toward its structuration. Mean excess of nitrogen is estimated to 902 000 tons en 2010 en France with significant disparity between regions and crop type. Nowadays, forest soil management involve the adaptation of silvicultural objectives to the local context in order to preserve soils by limitation practices impacts to an acceptable goal because practices changes and wood demand does not allow, in some cases, a sustainable management without input or compensatory works. Compaction risk mapping of French soils show that that compaction mainly due to agricultural and forestry mechanisation and is very high in 15 % of agricultural soil under wheat crop and one third of French agricultural soil has a high risk of soil compaction with again high spatial disparities. One of the specificities of France is the opportunity to access to different areas with wide range of climate, soil type, crop type, biodiversity, and local constraints (metropolitan France and French overseas). Proper functioning of agricultural, forest and natural's soils will be ensure by providing to the relevant managers, knowledge and decision making tools to allow them to adapt relevant practices for a better preservation of soil and to improve soil state, using indicative political or economic instruments

Specific research questions (following the conceptual model of INSPIRATION)

Demand

- Need to review methodological approach for the determination of water retention in soil under various pedo-climatological context and various scales (from the plot to the territory).

  Why: It is necessary for a better management of soil.

- Development of soil mapping at the local scale.

  Why: for the development of strategic tools better adapted to local diversity, complex development operations, but also to changes in the time of their territory.

- Develop prospective approaches, modelling for scenarios of evolution building, mechanisms involved

  Why: to be able to support change, inform decision to be taken for changing practice patterns.

Natural capital

- Understand soil carbon dynamic in the critical zone, biogeochemical mechanisms involved using integrated approaches and new tools.

  Why: To improve carbon storage in soils (4 per 1000 program launch by French Ministry of Agriculture) and to better understand how climate change impacts soil organic carbon dynamics.

- Need to research substitution solutions to conventional herbicides, insecticides and fungicides, antiobiotics.

  Why: To limit in the future further pollution of surface water and groundwater, soils and food.

- Need to research alternative solution to inorganic nitrogen and phosphorus fertilization.

  Why: To limit the cost of treatment of contaminated environment (such as water).

Land management

- Develop a new agricultural model, with an evaluation of alternatives cultural practices developed at a local scale to be translated at a national scale, taking into account territorial specificities for cultural practices implementation.

  Why: There is a societal challenge for an agriculture turned toward research of new practices and production systems more efficient on economic, environmental and social aspects.

- Integrate microbial biodiversity preservation in soil management to maintain essential soil function (carbon and nitrogen cycles).

  Why: Need to preserve biodiversity and soil functions.

- Need for knowledge about processes and factors controlling organic matter storage and fluxes in contrasted landscape.

Why: to be implemented in management strategies of organic matter at agricultural landscape scale (equilibrium between carbon storage and nutriments availability for plants).

Net Impact

- Understand nitrogen impacts under its various forms in order to quantify involved processes and spatial interactions implied in the nitrogen cascade, based on long term monitoring sites.
- Why: There is a need for innovative mitigation strategies of nitrogen loss and agricultural production system adaptation. Most long term experiments show that nitrogen surplus generates high emissions of N_2O in the atmosphere (with high warming potential).
- Need to understand mechanisms controlling natural nanoparticles reactivity in order to predict their transfer along the critical zone.

  Why: Reduce the exposure risk potential for humans and animal.
- Develop innovative technologies of soil tillage and evaluate the gain in terms of biodiversity preservation, efficiency, soil compaction.

  Why: There is a societal challenge to be addressed in order to facilitate re-use of treated soils in planning for and managing urban development.
- Requirement of decision making indicators to evaluate and adapt practices which could impact fertility of forest lands.

  Why: To improve knowledge for a better management of forests soils in relation to climate change.
- Requirement of decision making tools to adapt forest to climate change: need to know soil capabilities (especially available water storage capacity) and autecology of forest species in the aim to have a good adequation between environmental characteristics and selected species ecology to adapt to current impacts of a changing climate.

  Why: To prevent forest species vulnerability to climate change and in particular to water scarcity.

FR-3: Knowledge, functions, distribution and evolution of soils

In its report of 13 February 2012 on the implementation of the strategy (COM 2012 46 final), the European Commission deplores that "knowledge on the status and quality of soils remains fragmented and that the protection of soil is not assured in an efficient and consistent way in all states members." (CGEDD, 2015). In France, it remains several scientific, methodological or instrumental barriers concerning knowledge on functioning and spatio-temporal dynamics of soil (White book on soils 2013-2015, CNRS). For this purpose a major transverse axis adopted in the French “proposals for a national sustainable soil management framework” (CGEDD, 2015) covers the theme “Improve knowledge on soils”. Moreover, the French Environment and Energy Management Agency (ADEME) has counted about 100,000 ha of sites with historical pollutant activities in urban areas in 2014. Thus, a

critical and socially sensitive issue of knowledge on soils deals with the behaviour of pollutants in these sites. Knowledge in line following Technology Readiness Levels (TRL) is a way to ensure knowledge transfer to operational actors. This is the role of scientists to ensure such transfer since they are responsible for knowledge and methodology (Synthesis and recommendations for contaminated soil research (ADEME, 2015).

Specific research questions (following the conceptual model of INSPIRATION)

Demand

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Natural capital

- Better knowledge of natural environment, kinetics of pollutants transfer in soils (in particular urban soils), development of models integrating all the critical zone compartments (biological, mineral, atmosphere, hydrosphere).
- Why: the spatial diversity of soils in France is strength to improve and federate knowledge on soils. In situ monitoring is a way to acquire data for this purpose.
- Characterization and evaluation of the hazard of new pollutants (emerging / persistent) especially in groundwater. Characterization of diffuse pollution: on line monitoring, in situ metrology, integrative/passive sampling.

  Why: there is a sanitary challenge to understand the behaviour of these pollutants in soils and groundwater.

Land Management

- Demonstration sites to accelerate technological developments, verify the efficiency of treatment techniques and their validity in term of user's expectations; It could be also a communication channel to prove innovation realty to end-users.

  Why: beyond the technology improvements addressed by this topic, it responds also to a societal need of knowledge on the sensitive question of polluted soils.

Net impacts

Long-term observatories of the critical zone, allow the study of the spatial and temporal dynamics of the processes (ecosystem resilience, retroaction of the biological organisms on soil-sediment-water system and climate), facilitate inter-disciplinary approaches and promote exchanges among local authorities.

Why: general knowledge on long-term behaviour of the critical zone can support various local policy options.

- Improve knowledge on soils, particularly from a national scheme of soil data (to develop), networking of data producers and managers, pooling methods and development tools, as well as facilitate access to data.

  Why: knowledge on soils remains fragmented.

FR-4 Monitoring on soils

During the French national workshop, the need of indicators and data repositories to assess the functional behaviour of soils has been considered as a real societal challenge. In France, data repositories cannot be generic because of the diversity of soils on the domestic territory. Thus, new metrologies of soil characterization and numerical mapping should be developed (White book on soils 2013-2015, CNRS). Utility of observation systems to gather information on soil uses practices over long periods has been confirmed by a large number of scientists. Moreover, in the context global change, metrology of carbon stocks in soils is the first step to contribute to the reduction of greenhouse gases (Proposals for a national sustainable soil management framework, CGEDD, 2015).

Demand

- Need for sensors for monitoring plant growth and soil needs (carbon, nitrogen, phosphorus …).

  Why: the spatial diversity of soils in France involves various soil needs.

Natural capital

- Set up monitoring devices of soil conditions, the balance genesis vs erosion, the carbon content and carbon stock and the GHG emissions using instrumentation at different scales.

  Why: the special diversity of soils in France, as well as the context of global change requires improving knowledge on soils by in situ measures.

Land management

- Need for metrology and measuring devices for both characterisation and restoration of contaminated soil-sediment-water system (geophysical techniques, -omics tools, geostatistical approaches …), in-situ sensors to decrease soil heterogeneity, bioaccessibility of pollutants.

  Why: to guarantee the level of restoration of a derelict land.

Net impacts

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FR-5 Soil functions and services

Relationships between ecosystems, their functions and derived services are often complexes. Each ecosystem assures several functions and each service merged numerous ecological functions merged from different ecosystems. From theses links arise the close dependency between good health of ecosystems as a whole and the quality and sustainability of ecological services. For France, the issue of water arises mainly through the problematic of the quality of drinking water and sanitation. The problem is worsening background pollution from persistent pollutants and a risk reduction of water volumes actually. Forests are critically important for maintaining vital ecosystem functions and the services required for sustainable development. For example, in France, 3.9 Mha of forest stands present a water loss due to climate change (Mediterranean area) or to low soil water reservoir and particularly exposed to erosion. Only 5 % of the French forest (0.7 Mha) are located in area with an excess of water and are highly productive. Even if the wetland area considered as remarkable are well identified and protected (Natura 2000), common wetland area received less attention. Cumulative effects of small wetland degradation have severe effects in particular with the provision of ecosystemics services. Moreover, composition of the plant community influence physical and chemical soil-root matrix and deep root systems can influence subsurface ecosystem services.

Demand

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Natural Capital

- Develop an evaluation methodology for soils functions and ecosystem services, with values and suitable indicators, relationship between economy (services produced by the Earth and manufactured by the humans) and ecosystem functioning (agriculture and forest), indicators as a function of the future use of the treated soil.

  Why: There is a societal challenge by the consideration of the soil as an heritage vs expected .services.

- Develop knowledge about the interactions of the symbiotic relation between plant and N- fixing microorganisms.

  Why: to nitrogen and phosphorus availabilities in soils especially for forest soil.

Land Management

- Need for integrated assessment modeling for the modulation of landscape mosaics to optimize landscape services under various agro-systems.

  Why: to help decision-making and find a comprise decision between ecosystemics services (such as biomass production, water production, soil preservation) acceptable by socio-economics actors.

- Develop feasibility studies and remediation strategy for refunctionnalisation of degraded sites (brownfields, polluted soils) for rural, periurban or urban use.

  Why: To establish soils vulnerability maps (Geological Information System) coupled to soil use, to consider

Net impact

- Define strong indicators to evaluate and adapt practices for a lower impact on soil fertility, especially for forest soil.

  Why: for a better preservation of biodiversity and a higher valorisation of soil functions and associated ecosystemics services.

- Assess the long term impacts of management practices in the different soils and under the various climate conditions that exist in France and link them with long term assessments performed in Europe.

  Why: long term effects are often very different from short term ones and the trade-offs between the various functions fulfilled by agricultural soils differ in the long term.

- Develop useful diagnostic tools to evaluate soil potential and soil sensitivity under various pressures (soil depletion and soil compaction,…) and management practices taking into account knowledge on potential reversibility of past and current impacts. A very simple tool can be found here: http://knowsoil.catch-c.eu/KnowSoil/

  Why: Develop an engineering service of forest soils from prevention to feasibility and estimation of the cost and benefits of measures of restoration/remediation operations.

- Need to evaluate management and practices impacts on wetland area in order to reconcile biodiversity, regulation services (water resources, mitigation and clean-up from metallic and organic pollutions, …), production services (in particular of agricultural products) and cultural services (cultural heritage, landscape, leisure activities, …).

  Why: need to measure biodiversity erosion taking into account adaptative and evolutionary capacities of biological systems.

- Upgrading biological monitoring of soils during remediation process in a view of future ecosystemic services.

  Why: There is a high demand on the future use of the treated soil by the stakeholders.

Among the answers related with important/relevant documents, research agendas, research programmes underpinning these topics, the interviewed NKS cited also National Research Strategy, Generic Call of the French National Agency, White book on Soil from the French National of Scientific Research Centre , Sciences Academy on Soil prospective, thematic book from National Research Agency, pluri-annual intervention program of public land establishment (Nord pas de Calais territory), Chevassus-au-Louis report “economic approach of biodiversity and ecosystem services”.

6.4 Experiences regarding connecting science to policy/practice

6.4.1 Use of knowledge

Current French Status

The scientific knowledge can be defined as knowledge arisen from one community and validated by the peers. It is not absolute, being an interpretation of reality in one place and time and in constant evolution.

Scientific knowledge is used at various levels and for diverse objectives.

- First of all, it has a science / technical role as it enables to gain understanding on the soil-water-sediment system and on its interactions with human activities (resources, impacts, etc.). It is used to establish the state of the art, to give answer to technical issues and it enables to define future research needs and subjects.
- Second, scientific knowledge is used as one of the pillars of decision making and can be a driver for some regulatory frameworks. It has also a predictive and warning objective, as it enables the emergence of new subjects.
- Third, it is the building stone for both larger use through up-scaling and industrialisation or for innovation. It can convey to innovation development in response to final users (e.g. land managers) demands.

The main sources of scientific knowledge for the NKS are conferences, scientific publications, reports, colleagues, databases, web site of research organisms. Funders and end-users read professional papers. And 38 % of the NKS interviewed were involved in research projects.

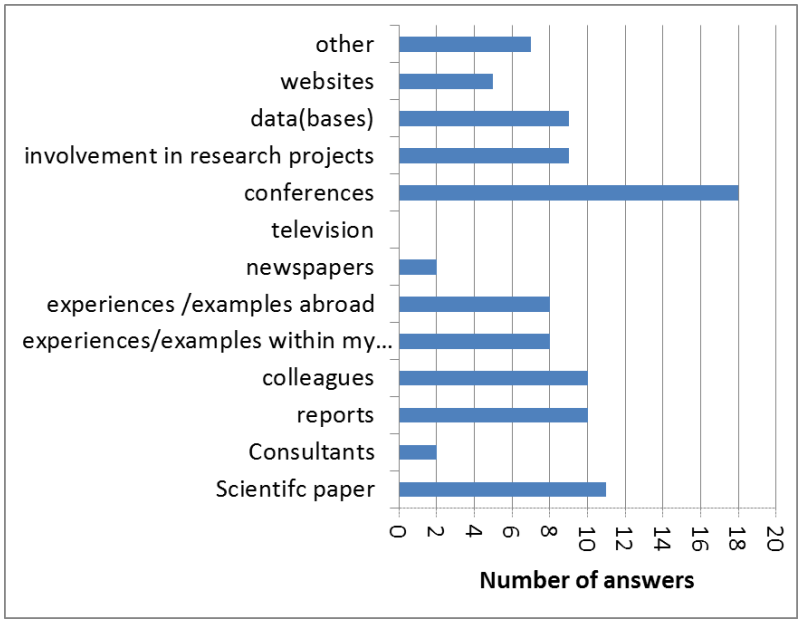


Figure: Sources of scientific knowledge cited by NKS (FRANCE)

For some stakeholders, scientific information was considered to be used only sporadically by lack of time or lack of confidence in the results.

Improvements for the use of Knowledge

The up-take of knowledge could be enhanced by improving communication of scientific results to a wide range of stakeholders. In order to reach that goal, several recommendations and propositions of actions were put forwards.

Adapt communication strategy and material to the targeted audience was deemed necessary: communication documents and their diffusion means shall be proposed and developed according to the demands and needs of the stakeholders and their level of (non)technicity. As an example, to widen-up communication, it is important to provide knowledge which is understandable and accessible by a large number of stakeholders. This can be undertaken through **science popularisation** and issuing flyers, website and information on social networks. Some stakeholders raised the need for **organisation dedicated to transferring information** to potential users.

There is a need to develop **tools to better preserve and manage the knowledge**. There is a real demand on having long-lasting tools (eg intelligent databases) which provide validated and up-dated knowledge, which include data, report and guidelines at various temporal and spatial scales. In addition, such tool have to be user friendly and may combine information on soils for all land-use types (urban, agricultural, and others).

Soil or sediment related knowledge being only a part of the information used by the stakeholders in their decision making process, it is important to show how it is related to the other environmental compartments and to their demands (social, economic and political aspects) in developing **integrated tools**. The up-take of knowledge in decision making may be improved by providing **decision making tools** combining information on various themes (such as water, wastes, urban planning) at local or regional levels, and enabling to relate scientific knowledge and decision-makers demands. Such tools could propose various types and levels of information adapted to the type of stakeholders and their demands.

The use of knowledge will be enhanced by **raising soil usefulness and resources awareness** among actors. This could be undertaken by providing meeting opportunities for all types of soil related actors. **Multi-actors** (including multi-disciplinary sciences, but also policy and society actors) **networks** may be created or enforced. **Training** on land and soil could be proposed to actors. Increase of **demonstration cases** to illustrate pilot or field applications of research and gain confidence on its further use was also suggested. In order to promote dissemination of demonstration case studies to a wide-range of stakeholders, it was suggested to enlarge demonstration sites proposers / providers to all type of stakeholders (more specifically site could be provide by local authorities and land managers which could then act as **exemplary driver**).

In order to favour use of knowledge, it is necessary for researchers' community to **shift from scientific recognition to societal usefulness**. At the moment, scientists in France are evaluated on the number of peer-reviews publications they achieved, and on the impact factor of their publications. As a consequence, they focus on providing good science, and short term results that are quicker and easier to publish. A shift to long term assessments and societal usefulness could be achieved with the following elements:

- Some research calls would gain interest for the society if they include funding for demonstrators, public involvement, building easy-to-use tools for decision making, and if they rated projects on these points too (not only on the peered-reviewed publications).
- **Stakeholders (and more specifically users) involvement** at all stages of the research process (offer to production). Public participation for collecting research data is already common in the biodiversity field and could be widely applied to soil issues.
- There is a need to **develop specific skilled human resources** such as "scientific translators" and "integrator" to facilitate the use of knowledge, and also translate society requirements into research questions.

To sum-up, in order to improve the use of knowledge, the following actions could be included in the SRA:

At a project level,

- Stakeholders (including users) involvements throughout the overall research project process (from the bidding to operational stages), multi-actors project and public participation shall be further developed.
- Subjects on integrated tools, decision-support tools, intelligent soil database systems and demonstration cases shall be proposed.
- Communication and dissemination through communication adapted to stakeholders' demands and science popularisation shall be promoted.
- Project award must be based on scientific excellence as well as societal impacts of the project.

At a programme level,

- Multi-actors network and training (through demonstration) shall be encouraged.
- Information & knowledge management tools shall be promoted.
- To facilitate interfacing between science and policy /society, specific skills (such as "translator", "interfacer" and "integrator") and specific organisation shall be developed.

6.4.2 Possibilities to set the agenda

Current French Status

The stakeholders issued from the business and policy sector (non-academic sector) reported that they were for most of them involved in formulation of scientific research questions at national level (elaboration of the action plan of the National Research Agency and mainly for the French societal challenge 1 – Efficient resource management and adaptation to climate change) - and at European level (Water JPI, Eranet Waterworks). For some of them, they also synthetize and wrap-up scientific knowledge: this is particularly the roles of the competitive clusters and networks of actors (researchers (namely those involved in ALLENVI), end-users, policy-makers …). Only a few of them take part in knowledge co-creation (Figure).

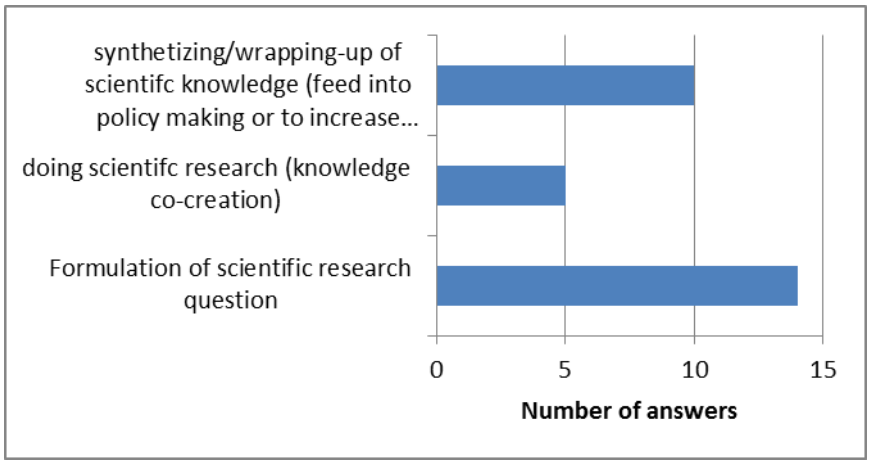


Figure : Involvement of formulation, knowledge co-creation and synthetizing of scientific knowledge.

From the results of all types of stakeholders consulted, the influence on the agendas and research policies happens at different levels:

- at the regional level, stakeholders are involved in regional instances, such as: Smart Specialization Strategy, Social environmental and economic regional council, River Basin committees, and implementation of regional patterns of ecological coherence.
- at the national level, stakeholders are involved as permanent board members of research organisations (INERIS, IFREMER, INRA, IRSTEA, IRD, BRGM), specific alliances of research (Allenvi, Ancre, Allisten) or funding agencies (eg ANSES, ADEME), as participants of strategic steering committees of the National Research Agency ANR; as responsible bodies for state organisations (such as CEREMA, IFSTTAR, IGN) or as invited guests of boards of director (eg ONEMA or in a near future foundation for research on biodiversity).
- At the European level, their presence in the program committees of H2020, as members of Era-Net programs, in groups of Joint Programming Initiative, as part of French delegations which are at the interface science and international policies (IPBES, global partnership soil).

- Some French teams are involved in the international Belmont forum programme but they are not represented in the national workshop (CIRAD, IRSTEA, IRD, Universities).

Research agendas reflect only partially the needs of stakeholders. In some cases specific structures were created.

The need for a targeted and interdisciplinary research was stressed.

Opportunities to improve participation in research agenda elaboration

At local scale, some research foundations were set up to respond adequately (due time and space) to stakeholders demands. In order to favour promptness and effectiveness of research in some circumstances, these initiatives consisting in creating a public-private partnership based on a research programme may be encouraged and supported. Feedback from such initiatives (administrative and science results) shall be shared and feed-in each other's for optimisation and experience mutualisation**. Promotion of local-initiatives** and **inter-local initiatives/projects** across Europe are questions worth asking.

The need to breakdown spatial and scale barriers has been firmly expressed. Indeed, local or regional stakeholders (even if defining local and regional programmes) are lacking influence on research agenda mostly defined at the national level. **Methodologies and fundings to ease bottom-up approach** need to be developed.

In order to increase opportunity for more integrated research, decompartmentalisation of actors and communication between research communities and among stakeholders must be achieved. Soil and sediment related actors will then have the capacity to formulate a strong integrated research demand. Communication can be enhanced through **development of multi-actors networks** and **enlargement of stakeholders' project involvement**.

The need to include research actions to provide solutions for **long-term soil and land management** was emphasized. As long term effects assessments require research and demonstration plots that last several decades, there is a need for more permanent well monitored research plots, and thus long term research funding on these plots.

Bridging the gap between the "rural world" (where soil is considered as a productive resource) and the "urban world" (where soil is a considered as a property entity) was also expressed. **Societal debate** is deemed necessary to develop **soil vision with respect to territory development and future**. Debate shall enable to discuss value related to its scarcity and to take into account all the possible uses of soil according to the various actors of a territory and according to a common vision for developing a territory.

6.4.3 Science – policy – practice

Current French Status

In this section, the interactions between science & policy and science & society are discussed.

As for Science – Policy, stakeholders' participations to the various strategic boards and working groups enable better recognition of the state of the art in public policy especially concerning contaminated land management as well as for the law on biodiversity.

Stakeholders cited national Science-Policy interface documents as follows: National Research Strategy, Generic Call of French National Agency, Strategic Agenda of ADEME, Conferences synthesis, Soil state in France, GESSOL program, Annual report on agro-ecology.

Nevertheless, stakeholders stressed the lack of political foresight on soils at both national and European level.

As for Science – Society interaction, stakeholders' points of view were divided. For some of the NKS, the societal impact does not exist or is difficult to quantify. For others, societal impact exists and is measurable by:

- Technical indicators such as scientific publications, patents, transfer of licenses, the establishment of technological platforms, environmental database available to the public, the elaboration of methodological guides of good practices, certification issued by the ministries and indicators issued from urban planning.
- Financial indicators such as number of start-up, numbers of jobs created.

A methodology has been published by The French National Agronomic Institute (INRA) called "impacts analysis of public agronomic research (ASIRPA) and appears to be a methodology to evaluate the economic, political, environmental and societal impact of research projects.

Improvement for Science-Policy practice

Formulation of policy was seen either as direct product of research, either from a product which needed to be established from research results. In the second case, the need for **resources dedicated to translation of science in policy** was expressed.

In order for science to play its full role in giving relevant information to policy making, it was considered important to have people having **both science and policy educations**. These persons could then act as translator or communicator between the science and the policy worlds. Moreover, it was suggested to **offer earth science training** to politicians to raise their soil awareness. In addition, **training on soil challenges such as soil protection and preservation** shall be included in educational programme (and not solely in the agricultural field). **Awareness on soils challenges** shall be raised for land managers or workers (such as municipalities, earthwork and infrastructure companies and land developers).Soil is part of an overall environmental system, which related to many stakeholders and actors. Soil regulatory requirements are scattered in many regulatory frameworks and soil regulation depending on the situation falls under environmental, water, waste, biodiversity and others regulatory frameworks. This makes the compliance on soil regulations and soil management complex and sometimes non practical as it requires multi-disciplinary skills and as the aims of the different regulatory frameworks can be diverging. With a view to simplification, stakeholders expressed their need for **decompartmentalisation of policies** and/or **homogenisation of soil regulatory framework**. Moreover, as soil processes are rather slow and difficult to monitor at low cost, there is an urgent need of **consensual indicators to be used in policy impact assessments**.

Increase of regulators and society involvement in research projects shall also promote communication and exchange. It is deemed important **to enlarge multi-disciplinary projects to multi-actors projects**, by including authorities, society representatives (public, Non-Governmental Organisation) in the project.

Overall science–society-policy interface may be improved by encouraging **positive communication** on soils. Soil(s) as an opportunity and as resources shall be conveyed to raise the importance of this resource for all stakeholders and especially policy makers and society. **Incentive for soil taking care** and soil stewardship, such as **soil label or award** may be promoted at local, regional, national, international level.

Better communication between soil communities and society will result in a **better awareness** of soil issues and opportunities by the **society** and in some case recall the importance of the relationships between human beings and the natural world. This could in turn act as **a positive driver** for societal, political and economic shifts with respect to soil.

6.5 National and transnational funding schemes

6.5.1 Funding schemes and possibilities for research funding

State of knowledge of the actual funding schemes

Regarding regional funding schemes the main funds identified are FUI, INNOV'R, PhD fund, INRA department PhD funds.

Only 40% of interviewees NKS have responded to the question which denotes a certain ignorance of these regional funds. The interview analysis highlights the inequalities in the level of fund allocation in the different Regions. However, it allows own research by companies.

100% of NKS interviewed have responded to the question about the national funding schemes. Calls to projects that were cited are those of the national funding agencies (ANR, ADEME, ONEMA), "investing for the Future" (IA). Most national funding windows are well known even if some are cited by a low number of NKS: Some initiatives, SOERE, LABEX and EQUIPEX, and Carnot specific call could provide funds for research on soils but they are open to associate teams only.

Different types of European funding have been identified by the majority of the researchers group. H2020 (Era-Net, JPI, COST, LIFE,…), INTEREG funds were cited by the great majority of NKS.

Regarding international financing schemes, they are mainly known by funders and researchers. Era-Net COFUND NORFACE, Belmont Forum, program 4 per thousand, UN[9], Hubert Curien Partnership were cited among the sources of financing by these actors.

Knowledge on existing financial funds, their position in the TRL[10] scale, the size of the project (money) and typology of actors were defined during the national workshop and were available in annex IV (see below).

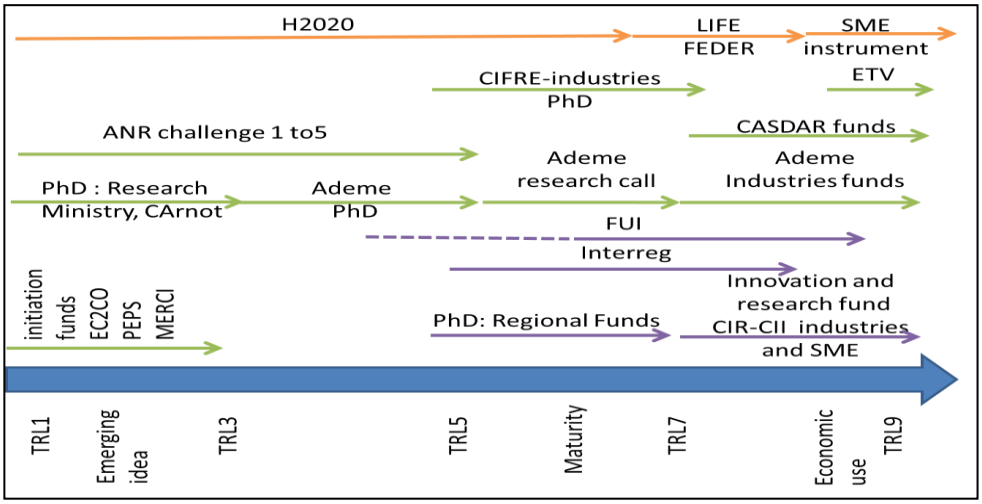


Figure: Synthesis of differents funding schemes at a national level by the French NKS (national workshop).

[9] UN : United Nations

[10] TRL : Technology Readiness Level

Increasing value of research and innovation

Several tracks have been proposed to increase added value in research and innovation such as:

- The set-up of demonstrators will improve the visibility and impact of research outputs at a trans-European level. They would be seen as a catalyst for socio-economic world.
- The need of more flexibility from regulator for full scale demonstrators.
- To accelerate and decrease the time to market, several ideas were introduced such as:
    - projects with industrial-innovative SMEs[11] partnership,
    - need for a more flexible regulation to use the innovations,
    - enabling the end users requirements more fully into account when preparing Research & Innovation programmes,
    - research actions with SMEs should be with a shorter time- frame than the PhD time-frame,
    - and opportunity for a researcher to spend an immersion in a French or foreign company during his professional carrer.
- Promote the hiring of PhDs in SMEs and facilitate co-hiring of researcher in university and private companies.

Researchers must solicit companies earlier to better address their need and to promote the exploitation of research results. Intellectual Property must also be discussed very early.

In France a strong expectation is expressed by the NKS with regards to Poles of competitiveness to be a facilitator due to their good knowledge of regional calls for tenders and their ability to bring together companies and research laboratories.

There is a need for feedback, to bring to knowledge, to better show the skills acquired during regional and/or interregional project and to benefit others (at national and European level).

What could be an ideal funding for an idea

To move from a research idea to its use on the market it takes at least 10 years (see below).

This requires to successfully manage and mobilize different funds at different stages of research. It often begins with the realization in parallel and successively of several PhD integrated in successive projects funded by French Agency before finding the most promising path. Its applicability can then be demonstrated through the use of European funds. The final demonstration of the industrialization of the idea can then be carried out by seed funding or private funds.

[11] SME: Small and Medium Enterprise

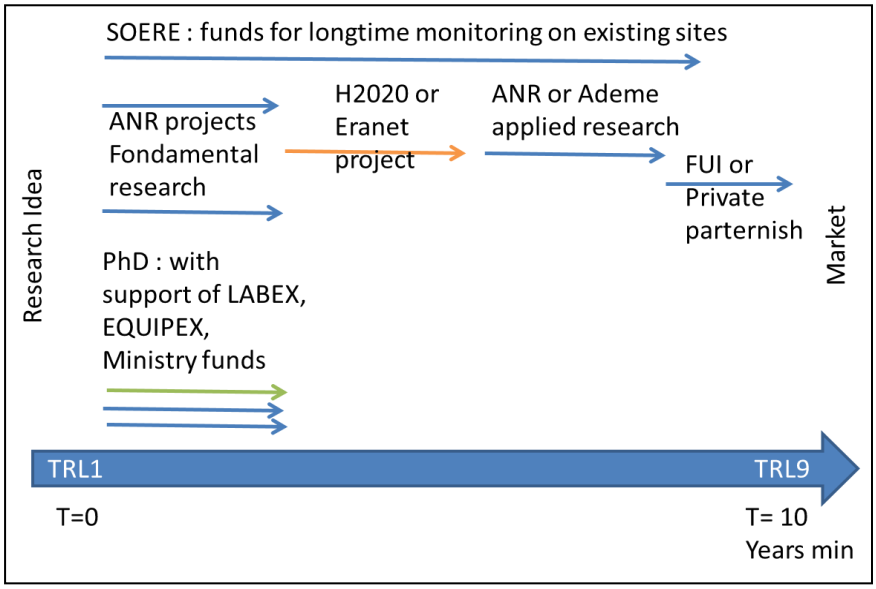


Figure: Potential funding chain to move from one idea to market implementation

When and to whom "sell" the SRA

In France, an analysis of the timeline for funding of the main funders in the scope of INSPIRATION was established for the last 5 years (see below).

		Months																						
		Jan	Fev	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Fev	Mar	Apr	Jun	May	Jun	Jul
Funders	Name of the call																				
ANR	Generic call for proposals							Call (2015)								Project selection					Selection publication, Call (2016)
ADEME	Bioressources (BIP)			Call																	
	Integrated Management of contaminated sites (GESIPOL)			Call (2013, 2014)																	
	(MODEVALURB)																				
	Climate change mitigation by agriculture and forest (REACCTIF)			Call (2011, 2013, 2015)																	
	Systemic approach to urbain refresh (Eco-Frais)						Call (2013,2014)														
	Organic Waste- return to soils (DOSTE)									Call (2013,2014)											
Environment Ministry / ADEME	Linear transport infrastructures, biodiversity and landscapes (INFRA LIN)											Call (2013)									
French National Agency for Water and Aquatic Environments (ONEMA)												Call (2013)									Selection publication
French Agency for Food, Environmental and Occupational Health & Safety (ANSES)	Health-Environnement and Health-Work (PNR EST)											Call (2014)									
French Public Investissement Bank (BPI)	Single Inter-Ministry Fund (FUI) - Regional cluster			20th Call (2015)								21th Call (2015)									
French Regional Innovation Strategies	Generic call for proposals				Call (2015)																

Figure 1: Timeline of the main Research and Innovation calls in France along the year.

Main funders in France are National Agency such as ADEME and ANR which develop their own Research Agenda (RA):

- For example, ADEME (French Environment and Energy Management Agency) has is agenda planned for year 2014-2020. The process to build the next RA will start in 2018. ADEME, as part of its RDI Strategy (2014-2020) identified five major research programs: sustainable cities and territories; sustainable production and renewable energy; agriculture, soil and forest biomass; air quality, impacts on health and the environment; energy, environment and society. ADEME has an annual budget of about € 30 million used through three instruments: the call for research projects, contracts in OTC and PhD grants.
- French National Research Agency (ANR) has an annual action plan (Generic Call) built in compliance with National Research Strategy (SNR). The action plan include, in the societal challenge part, main research priorities defined in SNR document and take into account contribution of the 5 Research Alliance, CNRS et Research ministry request. A specific line about the research needs on the critical zone and one about the research needs on the health-environment link have been integrated as specific lines since 2014 into the challenge (1) “Efficient resource management and adaptation to climate change”. The 2016 Work Programme's Generic Call for Proposals lists nine of the ten societal challenges as well as the Other-knowledge challenge (1) Efficient resource management and adaptation to climate change;(2) Clean, secure and efficient energy, (3) Industrial renewal, (4) Life, health and well-being, (5) Food security and demographic challenges, (6) Sustainable mobility and urban systems, (7) Information and communication society, (8) Innovative, inclusive and adaptive societies, (9) Freedom and security of Europe, its citizens and its residents, "Other-knowledge challenge". Financial instruments are Collaborative research projects (PRC), Collaborative research projects involving enterprises (PRCE), Young researchers (JCJC) instrument, Collaborative research projects – International (PRCI). Every year, the Generic Call iss revised in February for a call launch in July. The next call will be in July 2016.

Future opportunities identified

A call is announced on the Work Programme “Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy”. RUR 03 « Towards 2030 - policies and decision tools for an integrated management of natural resources » where some ideas highlighted in NSPIRATION might be funded.

6.5.2 Gaps in financial resources for research

Topic non covered by funding

Some areas of research and innovation are not enough covered by a scheme of funding as natural capital, soil-sediment-water component in an integrated approach, the health-environment link (interface between several challenges), observation of the critical zone, services provided by soils (basic knowledge, pedogenesis, ...), urban development. The lack of funding targets mainly the upper part of TRL research (or very applied research) as ANR generic call, which could finance these topics, is only dedicated to low TRL levels.

Needs and opportunities for funding

The allocation of supplementary financial resources could be find in co-fund, cash in kind, the joint mobilization of public and private funding, support from professional federations. The creation of a soil tax like the one set up on water to support research was also proposed.

In France, a public and private funding (INNOVASOL) was initiated, which offers a 5 years visibility to the researchers and a research that respond to the need of the private companies. The difficulty is on the constitution of this type of structure.

The need of adjustments on call modalities of projects calls were cited by industrials and SME: need of calls on limited themes corresponding to priority themes for stakeholders, need to have financing possibilities along the year, in order to match with time scales of industrial needs (those are not necessarily in phase with tenders and topics), a need to decrease the size of European project.

Continuous calls may give more chances to seize certain opportunities (e.g. temporary pilot site to address a specific question.)

A need for small grants to initiate and foster interdisciplinary subjects was also highlighted at national level.

During the course of the interviews, the need to **fund long-term actions was a recurrent theme** with the need to create long-term observatories that allow the meeting of different communities of researchers. This will also favour integrated research which was the other recurrent theme.

It is necessary to better define the "Chain of time" on a scientific topic: how the different projects fit together? How fast do knowledge that will solve the issue, progress? This will help to project selection and to define the necessary funding time.

There is a lack in France in funds for interregional projects (nonetheless, some funds exist at ONEMA on water).

For some research project the objectives are the increase in knowledge and not direct valuable result. Is there a need to evaluate the knowledge in terms of money to value this type of research for funders/civil society?

The Strategic Research Agendas must be built from societal issues (the needs of civil society) which must then be translated into research question. This highlights the importance of Prospective Workshop (ARP) which integrates representatives of civil society. The time for this process must not be underestimated.

The coming law on biodiversity could be an opportunity to highlight lacks/gaps of knowledge that must be filled by research. Those needed research (ecological restoration and evaluation of the ecological value, ecological equivalence, recognition or even certification of returned ecosystemic services) will need interdisciplinary research projects. Those projects may possibly be financed by the French Agency on Biodiversity which will be created soon.

What to avoid

Several comments have emerged from the interviews and the workshop: a need for balance between basic research funding and applied research funding, a need for flexibility in the execution of projects. Currently, the time dedicated to the design and monitoring of research projects is judged too large compared to the time dedicated to research. There is thus a need for administrative simplification and more confidence in the control of the project execution.

The decreasing financing rates on some calls make them non-eligible for certain actors.

On some subject the time allocated by research call from the emergence to the industrial transfer is not sufficient. Some subjects are funded and suddenly financing stops even if the research is not ended. The funding time must be variable according to the themes, objectives, geographical scales.

6.6 Other remarks made by interviewees

Further to the stakeholders' workshop first day outcomes, it was decided to focus last discussions on two topics: the integrated approach and the Region-State relationship.

6.6.1 Integrated approach

Following the first day of the French workshop the question of integrated projects appears as an important subject. Thus a world café on day 2 of the National Workshop was dedicated to this subject.

Some modalities were discussed for enhancing such integrated research:

- The need to recruit researchers who are in ability to respond to environmental issues rather than very sharp in their discipline, enhancement of new mixt profiles (with large spectrum and wide size of skills)
- Better integrate the humanities and social sciences in calls :
    - Increase training opportunities for the environment;
    - Find a balance between Social and Humanities Sciences (SHS) and the hard sciences in project leadership porting, especially when hard sciences need to be more visible to non-specialist public;
- Bring together research communities on urban soils and agricultural soils ;
- Stronger involvement of civil society players in research projects.

To initiate and foster interdisciplinary subjects it was important to have small project just to get to know each other's. Otherwise, one field is often only the "stooge" of the others. And the tender is not really an integrated one.

Multidisciplinary integrated approach needs an authority allowing multidisciplinary approaches, the creation of places involving different types of structures, need of a super-structure over existing ones that are focus on too narrow topics. ANR is regularly pushing this kind of integrated projects with an attractive budget, but the building of this kind of projects is often very complex and the assessment of the quality of such project is also a very delicate task inside a process of selection.

Lack of visibility of soils

The decline in research funding, as well as the lack of teachers on soil in numerous educational courses, a sector-based approach via regulatory codes (environment, water, urban planning) will not favour integrated research on soil.

We must reach an understanding of the strategic role of soils in land development and to consider the services provided by the land as a common good.

Territories management solutions (urban recycling, freeze non urbanized land…) face the legal aspect and some emerging solutions are thus non applicable: how to prepare convincing pre-normative scenarios for helping to push legislation.

6.6.2 Relationship between regional and national level

Current French status

The Regions and State actions are either collaborative or competitive. Regional actors and stakeholders are often in competition when bidding. There are currently no database gathering regional research projects and enabling a search by key word (theme, actors, fundings, etc.): the visibility of regional research outcomes remain low. More important, there is no working linkage between Regions for soil research, which could have enabled sharing their costs. Nevertheless, we have to note the real improvement of inter-visibility thanks to the action of the “Poles of compétitivité”.Stakeholders question the need to re-inforce Region-State relationship and to make regional projects more visible as these fields were considered very competitive by some.

Thematic fields and research objectives were considered in most case specific to regional or national scale.

Regional actions enabled to report local issue at national level.

There are existing financial schemes which enable to carry out regional / national projects. These schemes include CPER (State-Region programme contract) which amount decrease over the years, FEDER and LIFE fundings which support Europe / Region relationships and Interreg programme which support interregional projects. Bidding for European and Interregional calls was considered to be uneasy due to their administrative complexity and to their temporality which does not necessarily fits with the temporality or the research demands. Moreover, as no call covers all costs of a research project, there is a need for the research teams to apply to complementary research calls (Europe and Region for example), because the costs of soil sampling and analysis on long term projects is so high that no team can afford sharing them out of complementary grants.

Future development for the Region-State relationship

Added value of re-enforcement of Region-State link

Regional projects are for most of them financed by FEDER funds. The development of regional projects database was thought necessary to clearly identify the funded projects, to optimize funding sources, to exchange information and results at the national scale, to promote experience sharing and lessons learnt and to evaluate whether or not some projects are worth being duplicated in other region or being extended or generalised.

It was deemed necessary to perform listing and mapping of soil actors and to describe their skills in order to promote synergy and collaboration.

Need for clarification of various funding schemes and their specificities was expressed. Consistency of funding schemes to enable or not various scales integration was also mentioned. The development of funds available in the existing State-Region programme was proposed to encourage local project support.

At regional and national scale, the flagship common themes include:

- Methods for urban recycling, land use planning avoiding green use development;
- Tools to include heterogeneity of territory (various types of soils and climate conditions);
- Development of demonstrator (plateforms or pilot) to accelerate time to market of technologies and associated services, to share feedback.

French leadership themes identified during the national workshop are the following:

- Soil biosphere ;
- The diversity of ecosystems present on our territories (including overseas areas);
- How to plan long-term use and management of soil/Land. 4D and soil functions;
- Soil characterization and management in France and abroad (Africa).

6.7 Annexes

Annex Ia: NKS interviews in France

Date de l'entretien	Organisation	Entretien	Financeur	Utilisateur	Chercheur	Nationale / régionale / locale	Recherche Organisme de	Université /	Consult	Industriels	ONG	Réseau	Autres	Sol	Sédiment	Eau	Gestion des sols / territoires
2-sept.-15	EPF-NDC	Marc KASZYNSKI & Guillaume LEMOINE		1		1											1
28-juil.-15	ALLENVI	Christian VALENTIN			1	1						1		1	1	1	1
14-sept.-15	DREAM	Anne-Gaëlle DELBOY	1	1	1				1	1		1		1	1	1	1
10-sept.-15	AXELERA	Laure HUGONET & Aurélie OHANNESSIAN	1	1		1				1		1		1	1	1	1
5-oct.-15	TEAM2	Tristan DEBUIGNE		1	1				1	1		1					1
8-juin-15	ANR	Christine KING	1			1								1			
18-sept.-15	MENESR	Christelle MARLIN	1			1											1
21-sept.-15	ADEME	Frédérique CADIERE	1			1								1	1	1	1
9-sept.-15	AFTRP	Emilie MAHEUT		1		1											1
16-sept.-15	COMU Lille	Ludovic DEMEYER		1		1											1
26-août-15	PEXE	Florence JASMIN		1					1			1		1	1	1	1
27-août-15	IRSTEA	Patrick FLAMMARION			1		1							1		1	1
25-sept.-15	INRA	Isabelle COUSIN & Catherine HENAULT			1		1							1			1
9-sept.-15	UPGE	Patrice VALANTIN		1	1				1	1		1					1
4-sept.-15	INNOVASOL	Jean-Louis CRABOS & Olivier ATTEIA		1	1		1			1				1		1	1
2-oct.-15	MEDDE	Jurgis SAPIJANSKAS	1			1								1			1
9-sept.-15	GESSOL	Claire CHENU			1		1					1		1		1	1
18-sept.-15	FNE	Solène DEMONET		1	1						1			1		1	1
5-oct.-15	POLLUSOL	POLLUSOLS															
2-oct.-15	RENAULT	Nathalie GUISERIX		1						1				1		1	1
30-sept.-15	Adjointe Maire	Raphaëlle LEGUEN		1		1									1	1	1
12-nov.-15	MAAF	Corinne BITAUD	1			1								1			1
2-nov.-15	IRD	Sébastien BAROT			1		1							1			1

9-nov.-15	ONF	Noémie POUSSE	1		1	1							1			1
12- nov. 15	CR RHA	GAFFIOT Frédéric	1			1										1
			9	**13**	**11**	**13**	**5**	**4**	**6**	**1**	**7**	**0**	**17**	**7**	**12**	**23**

Annex Ib: NKS questionnaire template

Questionnaire template translate in French

A. Informations générales
1. Nom de la personne consultée : 2. Organisme : 3. Fonction :
4. Êtes-vous (plusieurs réponses possibles): ○ Autorité nationale / régionale/ locale ○ Université / Organisme de recherche ○ Petites et Moyennes entreprises (SME, i.e. < 500 employés) / consultant ○ Industriel ○ Organisation non gouvernementale / Association ○ Représentant / Coordinateur d'un réseau ○ Autre, préciser : …
5. Domaine de compétence (plusieurs réponses possibles): ○ Sol ○ Eau ○ Sédiment ○ Aménagement urbain ○ Urbanisme ○ Gestion des terres ○ Autre, préciser : …..
6. Est-ce que votre organisation finance de la recherche? ○ Oui. Préciser : ... ○ Non ○
B. Agenda Stratégique de Recherche
- Quels sont les défis sociétaux importants à vos yeux? [Liste des challenges sociétaux de l'Union Européenne] : ○ Contribuer à la Sécurité alimentaire et sureté alimentaire, ○ Sécuriser les ressources en eau potable, ○ Sécuriser l'apport et l'alimentation en énergie; ○ Réduire la consommation en ressources primaires, ○ Assurer une utilisation efficiente des ressources naturelles, ○ Contribuer au développement de stratégie d''adaptation de la société, ○ Contribuer à un environnement plus sain, ○ Sécuriser les infrastructures. *[Ces défis peuvent être utilisés comme une base pour définir les thèmes permettant de constituer les sujets de recherche de l'Agenda Stratégique de Recherche.]* - Selon les cas, quel(s) défi(s) supplémentaire(s), alternatif pourriez-vous suggérer / préférer ?

7. En partant de votre propre expérience : quels sont vos sujets principaux (besoins en recherche) qui pourraient être inclus dans l'agenda de recherche stratégique?
   d. Expliquer – Développer le sujet
      - *Qui sera concerné?*
      - *Qui est responsable?*
      - *Est un sujet d'intérêt pour votre organisme / département*
      - *Est-ce un sujet d'intérêt national uniquement ou bien un sujet partagé par plusieurs pays?*
      - *Où en est-on maintenant, où voulons nous être dans X années ?*
      - *Comment l'acquisition de connaissances nouvelles pourrait-elle être utilisée de manière efficace?*
   e. Priorité :

Priorité haute
Priorité moyenne
Priorité
Priorité faible
Pas de priorité

      - Quelle est l'urgence, i.e. qu'est qui tournerait mal si l'on ne faisait rien?
   f. Qui veut / devrait financer ce type de recherche?

      ○

8. <u>En fonction des sujets soulevés :</u>
   a. Quels sont les documents pertinents / important, les agendas stratégiques, les programmes de recherche qui couvrent les sujets? (état de l'art)
   b. En fonction des agendas et des programmes : quelles sont les dates de l'élaboration de la programmation et des opportunités pour influencer les agendas / programmes ?

C. Interface Science - Politique (SPI)

9. Comment définiriez-vous la « connaissance scientifique »?

10. Dans quel cadre utilisez-vous la connaissance scientifiques dans votre travail ?

11. Quelles sont les sources de connaissances (scientifiques) que vous utilisez dans le cadre de votre travail ?
    - ○ *Publication scientifique*
    - ○ *consultants*
    - ○ *rapports*
    - ○ *collègues*
    - ○ *expériences / exemples dans votre pays*
    - ○ *expériences / exemples à*
    - ○ *l'extérieur*
    - ○ *journaux*
    - ○ *télévision*
    - ○ *conférences*
    - ○ *implication dans des projets de recherches*
    - ○ *données (base de données))*
    - ○ *sites web, lesquels : …..*
    - ○ *autre, préciser : …..*

12. Jusqu'à quel point utilisez-vous la connaissance scientifique récente / nouvelle (état de l'art) pour votre travail ?

13. Jusqu'à quel point êtes-vous capable d'influencer (et comment) la mise en œuvre des agendas / politiques de recherche scientifique dans votre pays?

14. Jusqu'à quel point les agendas / politiques nationales reflètent vos besoins particuliers et vos priorités?

15. Jusqu'à quel point l'utilisation de l'état de l'art en matière de recherche a-t-elle été implémentée dans la formulation des politiques existantes de votre pays?

[Questions à destination de parties prenantes issues du domaine non-académique :]

- Avez-vous déjà été impliqué dans :
  - la formulation de questions de recherche scientifique?
  - la réalisation de recherche scientifique (co-création de connaissance)?
  - La synthèse / regroupement de connaissance scientifique, e.g. pour nourrir les politiques publiques ou pour augmenter les opportunités de marché?

[Si oui:]

Jusqu'à que point ceci a été satisfaisant / profitable sur une échelle de 1 à 5?

- *1-Très satisfaisant / Profitable*
- *2-Satisfaisant / Profitable*
- *3-Neutre*
- *4-Non satisfaisant / profitable*
- *5-Très insatisfaisant*
- Cela a-t-il bien fonctionné ?
- Comment pourrait-il être amélioré ?
- Qu'est-ce qu'il doit être évité / à ne pas faire ?
- Remarques complémentaires?

[Question à destination des parties prenantes qui ont des commentaires à faire (financeurs de la recherche)]

16. Comment l'impact sociétal de la recherche scientifique en lien avec l'objectif d'INSPIRATION peut-il être mesuré dans votre pays?

[Si oui:]

Jusqu'à que point ceci a été satisfaisant / profitable sur une échelle de 1 à 5?

- *1-Très satisfaisant / Profitable*
- *2-Satisfaisant / Profitable*
- *3-Neutre*
- *4-Non satisfaisant / profitable*
- *5-Très insatisfaisant*
- Cela a-t-il bien fonctionné ?
- Comment pourrait-il être amélioré ?
- Qu'est-ce qu'il doit être évité / à ne pas faire ?
- Remarques complémentaires?

17. Quels sont les documents à l'interface Sciences –Politique que vous connaissez et que vous nous recommanderiez?

D. Financement
18. Quelles expériences et attentes dans les schémas de financement (public / privé) avez-vous dans votre propre domaine qui puisse offrir des opportunités de recherche dans la gestion et l'utilisation des sols et des impacts sur le système sol / eau / sédiment ? - À l'échelle régionale? - À l'échelle nationale? - A l'échelle européenne? - A l'échelle internationale?
19. Comment augmenter, selon vous, la valeur ajoutée des différentes ressources financières pour mener des recherches qui vont répondre à des besoins nationaux et européens, en particulier sur les besoins en R&I sur les sols et le système sol/eau/sédiments ?
20. Avez-vous connaissance de domaines de recherche et innovation (R&I) qui ne se retrouvent dans aucun mécanisme de financement et qui nécessiteraient des schémas ou des infrastructures nouveaux/différents ?
21. Les approches intégrées (une nécessité pour le système sol-eau-sédiment) sont difficiles à financer et à évaluer par les communautés scientifiques. Quelles sont selon vous les améliorations à apporter dans ce domaine ?
Sur la base des expériences antérieures dont vous avez connaissance : comment mettre en œuvre les options de financements de manière optimale afin que : les besoins sociétaux soient remplis, qu'il y ait une appropriation et une utilisation des nouvelles connaissances produites à partir de l'agenda de recherche stratégique, qu'il y ait une multiplication des euros investis par les financeurs (retour sur investissement): *[Si oui:]* Jusqu'à que point ceci a été satisfaisant / profitable sur une échelle de 1 à 5? - *1-Très satisfaisant / Profitable* - *2-Satisfaisant / Profitable* - *3-Neutre* - *4-Non satisfaisant / profitable* - *5-Très insatisfaisant* - Cela a-t-il bien fonctionné ? - Comment pourrait-il être amélioré ? - Qu'est-ce qu'il doit être évité / à ne pas faire ? Remarques complémentaires?
E. Divers (Remarque, suggestions, exemples)

INSPIRATION acknowledges the received funding from the European Community's HORIZON2020 Framework Programme under grant agreement no 642372

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

Entrevues menées dans le cadre d'INSPIRATION :

Inspiration en bref:

Le projet INSPIRATION (INtegrated Spatial PlannIng, land use and soil management Research AcTION) est l'un des projets retenus en 2014 dans le cadre de l'appel H2020 sur le challenge sociétal «Changement Climatique, Environnement et gestion efficace des ressources et matières premières).

Le projet "Inspiration" (programme "Horizon 2020"), qui regroupe 21 institutions de 16 pays, vise à développer un agenda stratégique de recherche (ASR/SRA) pour une gestion des sols et une utilisation du territoire respectueuse de l'environnement, socialement acceptable et économiquement abordable.

Quatre thèmes et 8 questions transversales ont été retenus, c'est à travers ces prismes que seront analysés les conclusions des ateliers nationaux et que sera formulé l'agenda de recherche.

L'agenda sera construit sur la base d'un inventaire de l'état de l'art et en consultant les chercheurs, les utilisateurs finaux et les organes de financement dans tous les pays partenaires, lors d'ateliers nationaux.

Le projet vise également à imaginer des modèles de mise en œuvre de l'ASR et d'identifier les institutions de financement publics et privés prêtes à financer l'exécution de ce dernier.

Plus d'information sur le site web du projet : www.inpiration-H2020.eu

Interlocuteurs nationaux clé (INC/NKS) :

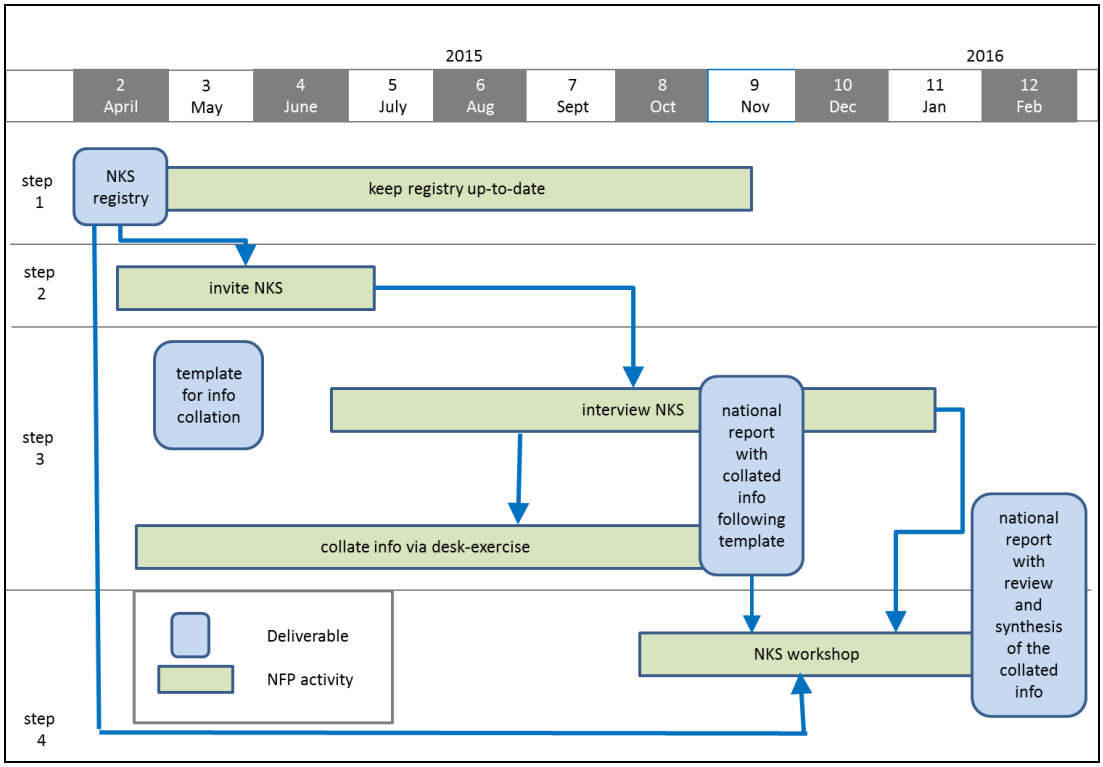
Une série d'entrevues d'interlocuteurs clés sélectionnés sera menée dans chaque pays sous la direction de "Points focaux nationaux » (PFN). L'objectif de ces entrevues est de rassembler pour la France :

- les besoins de la recherche et de l'innovation (R & I)
- les retours d'expériences concernant la connexion entre la science d'une part et les politiques/société civile et économique d'autre part,
- les schémas de financement nationaux et transnationaux existants et à inventer.

Les interlocuteurs retenus possèdent une bonne vue d'ensemble et une vision claire des besoins de connaissances à court, moyen et long terme dans leur domaine professionnel. Ces interlocuteurs viennent de différentes disciplines et horizons. Ainsi on y retrouve : des gestionnaires ; des chercheurs/experts dans les domaines des sols, sédiments et d'eau ; des financeurs et des décideurs…

Les entrevues :

La collecte de vos retours / expériences est cruciale pour le projet afin de nous aider à décrire l'état de l'art dans notre pays (les programmes de recherche nationaux en cours, les lacunes de connaissance, les priorités de recherche) comme entrée du futur agenda européen de recherche. Lors de l'entrevue, nous allons passer en revue une série de sujets et de questions. Ces entrevues seront au nombre d'une vingtaine minimum par pays. L'ensemble des données collectées lors des entrevues seront synthétisées dans un «rapport national». Cette synthèse sera examiné lors d'un atelier national qui permettra de hiérarchiser les sujets que la France souhaitera pousser/porter dans l'agenda stratégique de recherche (ASR/SRA). L'ensemble des rapports nationaux produits seront finalement utilisés comme entrée pour l'élaboration d'un SRA européen et faire correspondre les besoins de recherche avec les financements possibles, notamment transnationaux.



Le déroulé de la première année du projet INSPIRATION est décrit ci-dessous

Exemple de questions :

Besoins en Recherche et Innovation (R & I)

- Quels sont les défis sociétaux important à vos yeux?
- A partir de votre propre expérience : quels sujets spécifiques (besoins de recherche) devraient être inclus dans le SRA?

Expériences en matière de connexion entre la science et les utilisateurs

- Comment définiriez-vous les «connaissances scientifiques»?
- Dans quelle mesure l'état de l'art de la recherche scientifique est/a été utilisée pour la formulation des politiques existantes dans notre pays?

Modalités de financements nationaux et transnationaux

- Est-ce que votre organisation financement de la recherche?
- Quelles sont vos expériences et vos attentes dans les modalités de financement (public / privé) votre propre domaine ? Quelles opportunités de financement/ modèle de financement pour de futures recherches identifier vous ?

L'intérêt de participer:

- Une chance d'influencer l'agenda stratégique de recherche européen sur la gestion des terres et du système sol/sédiment/eau à la lumière des défis et des besoins de la société;
- Disposer des résultats du projet: connaissance des besoins de recherche exprimés ; aperçu des modèles de financement prometteurs aux différentes échelles (sous-national, national, européen, international) et identification des opportunités pour une meilleure connexion entre la science et les utilisateurs des résultats de la recherche : société civile, politique, monde économique;
- Utilisez la possibilité d'entrer en contact avec d'autres réseaux dans et en dehors de notre pays, et identifier les pays partageant les mêmes défis que nous.

Annex II: Documents used for the FR desk study

A. Rivière et H. Hervieu (2015) – Transition (s) vers une économie écologique. Collection « Etudes et documents » de la Délégation au développement durable (DDD) du Commissariat Général au Développement Durable (CGDD), N° 129, 45 pages.

ADEME (2015) – 3ème Rencontres nationales de la recherche sur les sites & sols pollués. Synthèse et recommendations pour la recherche, 56 pages.

Agriculture et Foncier (2014) – Concurrences entre usages des sols et entre usagers des sols agricoles : la question foncière renouvelée. Cahier Demeter.

ANR (2015 – Plan d'action 2016, 176 pages.

Bellec P., Lavarde L., Madignier M.L. (2015) – Propositions pour un cadre national de gestion durable des sols. Rapport CGEDD n°010068-01, CGAAER n°14135, 135p.

CNRS (2015) – Livre blanc « Les sols » 2013-2015 - Rapport du Réseau Thématique pluridisciplinaire « sols » juillet 2013 – juillet 2015, 67 pages.

De Deyn, G. B. and W. H. Van der Putten. 2005. Linking aboveground and belowground diversity. Trends in Ecology.

Evaluer les écosystèmes et les services écosystémqies (2014) - Séminaire du 9 décembre 2014, EFESE (l'Evaluation francaise des écosystèmes et des services écosystémiques).

F. Jasmin et G. Aymé (2014) – Sites et sols pollués : Etude sur le panorama des financements disponibles en France pour la recherche et la mise en place de solutions innovantes – Rapport ADEME, 21 pages.

Fondation pour la recherche sur la biodiversité (2015) -Prospective scientifique pour la recherche française sur la biodiversité. Série FRB, Réflexions stratégiques et prospectives. Ed. Jean-François Silvain et Flora Pellegrin, 56 pp.

Hooper, D. U., D. E. Bignell, V. K. Brown, L. Brussaard, J. M. Dangerfield, D. H. Wall, D. A. Wardle, D. C. Coleman, K. E. Giller, P. Lavelle, W. H. Van der Putten, P. C. De Ruiter, J. Rusek, W. L. Silver, J. M. Tiedje, and V. Wolters. 2000. Interactions between aboveground and belowground biodiversity in terretrial ecosystems: patterns, mechanisms, and feedbacks. BioScience 50:1049-1061.

Ministère de l'Agriculture, de l'agroalimentaire et de la forêt (2014) – Agricultures produisons autrement, Rapport Annuel sur l'agro-écologie, 26 pages.

Sols et environnement, Chiffres clés (2015) – Repères, novembre 2015, CGDD, service de l'observation et des statistiques, p104.

Stratégie Nationale de Recherche – rapport de propositions et avis du conseil stratégique de la recherche, 2015-2020.

Water JPI (2014) – Strategic Research & innovation agenda, 69 pages.

Annex IIIa: National Workshop Agenda

HORIZON2020 CSA INSPIRATION

Atelier National FRANCE

Paris, 15 – 16 octobre 2015

Haussmann Saint Lazare, 92 rue Saint-Lazare, Paris 9

Agenda

15 octobre 2015

13:00	**Café d'accueil**	
13:30 - 13:45	**Ouverture de l'atelier** Tour de Table	M-C. Dictor
13:45 - 14:00	Présentation du projet Inspiration	M-C. Dictor
14:00 - 14:15	Objectifs de l'atelier national	M-C. Dictor
14:15 - 14:30	Résumé des entretiens Challenges identifiés Sujets de recherches Lien entre Science-politique-société Schéma de financement	M-C. Dictor
14:30 – 16:05	World Café™ sur : Challenges et Sol Sujets de recherche pour l'Agenda Lien entre Sciences / Politiques-Société Schéma de financement	Tous Rotation d'une table à l'autre (4 groupes), ¾ d'heure / table (5 minutes pour changer de table)
16:05 - 16:20	**Pause**	
16:20 – 18:00	Suite du World Café™	Tous Rotation d'une table à l'autre (4 groupes), ¾ d'heure / table (5 minutes pour changer de table)
19.00 - 21.00	**Diner Brasserie Mollard**	

16 octobre 2015

8:45 - 9:00	**Café d'accueil**	
9:00 - 9:30	**Résumé du premier World Café ™**	Modérateurs des tables
9:30 - 11:45	Second World Café™ –approfondissement de 3 sujets du premier World Café™	Tous Rotation d'une table à l'autre (3 Groupes mixte)
11:45 - 12:00	**Pause**	
12:00 - 12:30	**Résumé du second World Café ™**	Modérateurs des tables
12:30 - 13:00	Clôture et prochaines étapes	M-C. Dictor
13:00 - 14:00	**Déjeuner – Brasserie Le Printemps**	

Annex IIIb: Participants to French National Workshop

Nom	Fonction	Au titre d' INSPIRATION	Organisme
BESNARD Chloé	Chef de projet	POLLUSOLS	Gestion administrative, coordination financière et communication du projet POLLUSOLS
CADIERE Frédérique	Correspondante recherche du service friches urbaines et sites pollués	ADEME	8 ingénieurs sur gestion des SSP, animation de l'activité recherche, Ademe participe à l'organisation des journées SSP
CHAMBON Sophie	Chargée de mission	UPDS	Association ; intérêt pour thématique de financement
CRABOS Jean-Louis	Directeur Programmation et Développement	INNOVASOL	Fondation de droit privé créer depuis 5 ans ; coordinateur du réseau SAPHIR
DEBUIGNE Tristan	Coordinateur du pôle eau-sédiments – coordinateur du projet CEAMaS	TEAM2/CD2E	Eco-transition des entreprise du Nord pas de Calais, réutilisation des matières pollués des déchets des sédiments ; coordinateur du projet CEMAS
DELBOY Anne-Gaëlle	Chargée de mission Projets Eau & Environnement	DREAM	Protection des ressource, réduction impact sur l'eau et les milieux connexes ; traitement sol et eux et métrologie
DEMEYER Ludovic	Chargé de mission friches industrielles	Métropole Européenne de Lille - MEL	Architecte-urbaniste, en démarche de redéveloppement de friche, avec une démarche à l'échelle du territoire, chainage entre différents acteurs : redéveloppement de la ville sur elle même
DEMONET Solène	Chargée de mission, Coordinatrice du réseau risques et impacts industriels	Animatrice du groupe de réflexion sur les sols au sein de la FNE	GT sites et sols pollués du GCRT, souhait d'élargir la thématique des sols à FNE sur tous types de sols
FEIX Isabelle	ADEME	Expert national Sol	EPIC
HENAULT Catherine	DU Science du sol	INRA	Organisme de recherche public
GOFFAUX Robin	chargé de mission pour RGscope	FRB	Bio-indicateur, suivi des observatoires
GUISERIX Nathalie	Référente sites et sols pollués	RENAULT	Industriel en début de travail de recherche ; participe au groupe de travail CPRT

KING Christine	Responsable scientifique de programme Défi 1	ANR	ANR membre de l'IAB d'INSPIRATION ; en tant que membre aide à l'établissement du panorama de la recherche
OHANNESSIAN Aurélie	Animatrice GT sol	Axelera	Chimie- environnement - Projet Friche : Ademe, BRGM, Axelera, Durapole, AMI Innovation, organisation de journées technique autour de la thématique
SAPIJANSKAS Jurgis	Chargé de mission biodiversité, forêt et sol	MEDDE/CGDD/DRI	Interface sciences /politiques, ne finance plus de recherche directement, lien vers acteurs de la réglementation, s'intéressent à tous les types de sols
SIMMONOT Marie-Odile	Professeur de génie des procédés	GISFI	Effort de projet interdisciplinaire ; LoRver redéveloppement de site industriels pour culture énergétique et récupération des matières
TURPIN Nadine	Chargée de recherche dans l'UMR METAFORT	IRSTEA	Economiste de l'environnement ; gestion durable des sols agricole, Bio, sécurité alimentaire, rendement, gaz à effet de serre. Levier et barrière pour les agriculteurs Projet Catch-C
VALENTIN Christian	Directeur Adjoint UMR iEES, IRD, Paris	Animateur du sous-groupe "Sol" du GT "Agroécologie et Sols" d'ALLENVI	Pédologue, co-anime une réflexion sur la recherche sur les sols : livre blanc sur les sols (CNRS /INSU) ; Académie de l'Agriculture, journée sol des villes/sols des champs

Annex IV: R&I funding options in France

	Research and Innovation funder**	Name of the programme*	What do they fund?***	Whom do they fund?***	More info****	TRL
Regional						
1	French Public Investissement Bank (BPI)	Single Inter-Ministry Fund (FUI) - Regional cluster	collaborative R & D projects to the emergence of processes, innovative products or services, with a potential of placing on the short- or medium-term market (3 years max. after the end of the project).	Consortium At least two companies and a public research institution or training. The carrier is necessarily a company able to demonstrate managerial and unifying qualities. Funds Min 750k€ of subsidies	http://competitivite.gouv.fr/les-financements-des-projets-des-poles/les-appels-a-projets-de-r-d-fui-375.html	7to9
2	Régional council	French Regional Innovation Strategies		Consortium Individual aid to companies, the Region supports investments, including environmental and R & D programs through regional support schemes for investment and Innov 'Region Funds Grants and repayable advances • to a maximum of 45% of the project budget for SMEs • 30% for ETI less than 2,000 employees, • 100% of the marginal costs or 40% of full costs for research organizations.	http://www.europe-en-france.gouv.fr/Centre-de-ressources/Etudes-rapports-et-documentation/Synthese-des-Strategies-Regionales-de-l-Innovation-en-vue-de-la-specialisation-intelligente-des-regions-francaises	8to9
		Calls for research projects of regional interest	Depending on the Region, soils is clearly identified only in some regions : Region Aquitaine is the founder and funder member of the foundation Innovasol (www.innovasol.org) ; Region Champagne-Ardenne FREC (Fonds Régional Environment Climate), common stock of the Region with ADEME; Région Haute-Normandie : Large Search network "Environment Risks Agronomy Territory" (GRR TERA) Région poitou-charengtes : "natural environments and environmental risks". Région Pays de loire ; biodiversity, The Plan of competitiveness and resilience of farms (PCAE) of the Loire 2015-2020		http://www.paysdelaloire.fr/services-en-ligne/appels-a-projets/ http://www.regioncentre-valdeloire.fr/accueil/les-services-en-ligne/appels-a-projets/recherche-et-innovation.html	5to7

			financing and co-financing of doctoral grants, and investment and operating grants			
		Appel à projets Coopération et mobilité internationales Rhône Alpes (CMIRA) Val de Loire (Studium Loire Valley)…	Home of experienced international researchers in the laboratories of the region Centre-Val de Loire		http://www.ens-lyon.eu/international/appel-a-projets-cmira-acceuil-pro-explora-pro-2015-16-245093.kjsp?RH=ENS-LYON-FR http://www.lestudium-ias.com/news/call-applications-smart-loire-valley-programme-campaign-20162017	1to6
3	French water agency					
National						
1	Caisse des Dépôts et Consignations (CDC)	Investissement d'avenir "teeritoire à énergie positive"	Territorial integrated projects for the energy transition loans to SMEs wishing to develop projects on territories (212) winners of the call for projects "Territories positive energy for green growth" following themes: • alternative management of the water cycle, • innovative systems for reducing health risks, • modeling and simulation of environmental dynamics, • digital tools for design and monitoring of urban projects, • Planning and exemplary in terms of energy transition and biodiversity.	SME Funds The minimum loan amounts to EUR 300 000. And, it is at most 50% of total financing need made as a loan. Financing under the project loan form must be at least 600,000 euros.		7to9
2	Caisse des Dépôts et Consignations (CDC)	Biodiv PME (Investissements d'Avenir)	Development to market of products or services on the horizon from 6 to 15 months 4 following axes: • Develop the observation systems, knowledge technologies, measurement and understanding of ecosystems • Prevent and limit the impacts of developments and human activities on biodiversity and restore degraded environments • Innovate in partnerships, design and financing of			8to9

			projects in favor of biodiversity • Use sustainable ecosystem services			
3	Goverment	Investissement d'avenir "Qualité de l'eau et gestion de la rareté"	Marketing of products or services on the horizon of 2 to 5 years 4 following axes: • The treatment plant of the sustainable city • The water desalination plant • Smart water networks • Intelligent resource management			7to9
4	Private compagnie : VEOLIA		Innovative solutions for online measurement of sulfides in waste water	startups and SME		
5	Ademe	appel à candidatures Thèses 2016	Five main programs: 1. sustainable cities and territories, 2. Sustainable production and renewable energy, 3. agriculture, forestry, soil and biomass, 4. air quality, impacts on health and the environment and energy 5., environment and society.	<u>Consortium</u> Associate a candidate, a host laboratory and a co-financing partner (public or private) <u>Funds</u> ADEME is co-financing up to 50% of the remuneration of the doctoral student.	http://www.ademe.fr/recherche-innovation/appels-a-projets-recherche	1to5
		Bioressources (BIP)	Background: biomass, renewable resource, can be valued for the production of raw materials for chemistry and materials, the production of liquid and gaseous biofuels, the production of heat or electricity, etc. In the short term, given the competing uses and limited areas, the development of bioenergy and biobased products required to maximize the use of biomass and diversify exploitable bioresources. Projects were required to enroll in at least one of the two themes detailed in the call for projects text: Biorefineries, biobased products for chemistry and materials, biofuels and production of renewable and clean energy from biomass.	Four types of projects can be financed: • Research new knowledge, • support for eco-innovation (dedicated SME) • Industrial Research, • experimental development. Funding method ADEME participates financially to the tune of 25% to 100% of eligible expenditure. The maximum amount of aid, mostly paid in the form of a grant of 250 k €.		5to7
		Integrated Management of contaminated sites (GESIPOL)	2 priorities have been identified: - Axis 1: innovate and improve processing techniques applied to soil and groundwater and evaluate their performance; - Axis 2: develop the technical re-functionalization of degraded soils left in place			

		Modeling and assessment for the actors of the cities and territories of tomorrow (MODEVALURB)	This call is interested in evaluation issues of health impacts, environmental urban forms and their performance modeling (in particular energy). assessment, urban modeling and forecasting and is divided into four themes: Area 1: Health and Environmental Impacts and comfort of urban forms Axis 2: Energy efficiency of urban forms Axis 3: Planning Factor 4 and articulation between planning and strategic direction of the energy-climate areas Priority 4: Urban and Digital Practices			
		Climate change mitigation by agriculture and forest (REACCTIF)	This call aims firstly to improve knowledge of the contribution of agriculture and forestry to the struggle against climate change and secondly to identify obstacles and levers to allow stakeholder s' commit to energy and ecological transition. Four research themes were identified: 1.Flux gas emissions and carbon stocks (soil, crops, livestock, forests) Agricultural and forestry 2.Filières, production mobilization 3.Construire strategies across territories 4.Mettre implement the ecological transition: social and economic approaches			

		Energy Environment Society program	The Energy Environment Society program is dedicated to social science research, economic and social to enable better integration of the environment into individual and collective decisions. It is closely linked with the programs "Sustainable cities and territories", "Sustainable production and renewable energy", "Agriculture, Forestry, Soils and Biomass" and "Air quality, health and environmental impacts." The expected results are: Sunrise locks and identify the levers of change and diffusion of new technologies in environmental terms virtuous and characterize the economic, political, institutional, legal and sociological (cultural, psychological ...). ; Know and analyze social innovations and "new" economies, making their assessment and identify emergency conditions; Supporting public policies and speculate on possible future; Infléchir consumption patterns.			
		Systemic approach to urbain refresh (Eco-Frais)	The call is in particular the knowledge development of socio-economic issues associated with the ecosystem approach to refresh, and how to enroll in an evolving political dynamic adaptation to climate change ("adaptation pathways") and reduction greenhouse gas emissions. The call includes two axes: Socioeconomic 1.Evaluation an ecosystem approach to urban refreshment; 2.Développement evolutionary strategies of urban refresh integrating an ecosystem approach. Biodiversity is excluded			
		Organic Waste- return to soils (DOSTE)	The research concerns the desired chain from upstream (organization of the management of organic matter on a territory), until treated (composting, anaerobic digestion and mechanical biological sorting) and development (material and energy). Research will be multidisciplinary and conducted at several levels (design offices, laboratories, experimental sites, in situ			

			treatment plants, ...).			
	Ademe + Ministry of Environment +French Association for Biodiversity + private funders	Transport infrastructure Land, Ecosystems and Landscapes (ITTECOP).	Four research areas are open: • 1. Linear transport infrastructure: dynamic landscapes and biodiversities • 2. Dynamics of biodiversity and management of linear transport infrastructures and their rights of way (LTI) • 3. Operational research in support of the design / design and adaptation of biodiversity to develop ILTE there • 4. Reversible LTI	Three possible types of answers are open in this appeal: • research projects • the "exploratory" projects • A state of the art / summary of the facts proven on "infrastructure and biodiversity"		
	Ademe (+ commissariat général à l'investissement)	Appel à Manifestations d'Intérêt – Industrie et agriculture éco-efficientes (AMI INDU)	Four priority areas covered: Agriculture and wood industry, Agro-Food Industry, Chemical and paperboard, metal industries, industrial and construction materials.	<u>Consortium</u> AMI is intended for OEMs and manufacturers, manufacturers of agricultural inputs but also to design offices and engineering firms, installers and operators, as well as industrial users and farmers, able to disseminate technological offer in France and abroad. Next closing 29/02 / 2016- Intermediate Fencing: 02/29/2016. <u>Funds</u> •either repayable advances • either partially grants: consist of one fifth of grants and repayable advances four fifths. The refund will be based on the progress and commercial success of the project grant •Either: reserved for small amounts, such aid is calculated with aid rate minuss	https://appelsaprojets.ademe.fr/aap/AMI%20INDU2014-75	7to9
	Ademe	ETV : Environmental Technology Verification	Verify performance claims, as required by involving Structures testing. 4 areas are included in the national experimental program (others than the EU ones): - Monitoring and air treatment, - Monitoring of soil and groundwater remediation of polluted soil	Enterprises	http://www.verification-etv.fr/	8to9

			- Environmental technologies in agriculture, - Process and virtuous productions.			
	Ministry and ADEME	Environmental soil functions and mangement of natural soil capital (GESSOL)	Background: The soil is a nonrenewable resource on the human scale, which fulfills a multitude of functions essential to life, but is also subject to threats growing (contamination, urban sprawl ...) affecting the functions of soil and generate significant negative externalities. The APR aims GESIPOL the fight against industrial pollution, degradation of soil environments, air, groundwater and biosphere and the valuation of land resources constituted by the contaminated land. Projects should be targeted on the "applied research" and rely on concrete experiences and initiatives on field	This call for proposals is open to research organizations (public or private) to study Business and office involved in the field of polluted sites, clients, communities and the actors of development.	ended in 2015, future unknown	
7	French National Agency for Water and Aquatic Environments (ONEMA)	"Innovations and changes in practices: Fight against micropollutants in urban water"	2 questions: What solutions to identify and prioritize micropollutant to be of interest? What solutions and change practices to avoid or reduce their discharges to networks and their effects on water resources? Changes in practices of users and professionals, targeted waste collection, retention or treatment before discharge into collective networks, urban development for the management of rainfed and network overflows, substitute products, measurement methods of micropollutants and their flows , etc ...	Local authority, service provider, research laboratory, enterprises Multipartnership leading by public authorities	http://www.onema.fr/Appel-a-projets-Micropolluants-dans-les-milieux-aquatiques	
8	French Agency for Food, Environmental and Occupational Health & Safety (ANSES)	Health-Environnement and Health-Work (PNR EST)	This call aims to lead the scientific communities to produce data useful to the different phases of the analysis of health risks and thus to bring research and scientific expertise. The call for projects in 2015 relates to the assessment and analysis of environmental risks to human health in the general		https://www.anses.fr/fr/content/appel-%C3%A0-projets-de-recherche-du-pnr-est-2015-sur-les-th%C3%A8mes-sant%C3%A9-environnement-et-sant%C3%A9	

			population or at work.			
9	ANR	Generic project	Projects must fit into the themes of "grand societal challenges" defined by the ANR in connection with the themes of the Horizon 2020 program.	Consortium At least 2 separate structures in a public research organization. Funding method subsidies SMEs: up to 45% of eligible expenditure No SME: from 25 to 30% EPIC: 50% Laboratories: 100% of the marginal costs (except in special cases) The amount of aid granted to projects are generally between 100 and 800 k € for a period of 24-48 months, depending on the type of consortium, the number of partners involved and the scientific ambitions of the project.	http://www.agence-nationale-recherche.fr/Appels	1to5
		Chaires industrielles	The program is open to all research themes on topics defined jointly by the parties concerned, with 3 objectives: 1.conduct research in priority and strategic areas for public and private actors involved in the pulpit via a strong and lasting partnership. 2.doing training through research quality by adding vision, methodologies and experience of economic actors to the home of doctoral or post-doctoral students in public research laboratories of high level. 3.allow teachers and researchers, French or foreign, on the move or not, develop their skills in an ambitious research service.	Fund: Funding will be granted for a maximum period of 48 months. The contribution of the ANR is the same as the one from the private companies (cash contribution paid to the host institution).	http://www.agence-nationale-recherche.fr/financer-votre-projet/appels-ouverts/appel-detail0/chaires-industrielles-2016/	5to9
		European or International Scientific Networks (MRSEI)	Aims to facilitate the access of French researchers in the European funding programs (including 2020) and / or international. Scientific network, covering topics from all disciplines. These requests must meet European or international large-scale projects, with a major impact on scientific,	Funds 30k€ for a period of 18 months. The aid received will fund exclusively any means that will define the scientific and economic interests leading to the installation of a European or international project. 2 calls per year	http://www.agence-nationale-recherche.fr/financer-votre-projet/construction-de-l-espace-europeen-de-la-recherche-et-attractivite-internationale-de-la-france/mrsei-montage-de-reseaux-	1

			technological or societal.		scientifiques-europeens-ou-internationaux/	
	ANR +Ministry of Industry	Investissement d'avenir Carnot PME	Project must be in line with the 14 defined industrial sectors	Consortium: Reserved for the Carnot label Research Institute; obligation of submission of a consortium of several institutes		3to9
10	Banque Publique d'investissement (BPI)	«Projets industriels d'avenir (PIAVE)»	R & D and industrialization to strengthen the competitiveness of French strategic sectors. Ex: call for thematic projects "Innovative products for safe, healthy and sustainable - functional foods and tailored"! Project that will produce business and job opportunities: • corresponding to one or more solutions of New France industry, particularly in the implementation part of a roadmap endorsed by the Steering Committee 9 solutions. These projects are carried individually by a company and can involve other companies, laboratories or research institutions. • corresponding to one of the objectives of a strategic sector committees. The project may alternatively be carried by a structure uniting several companies or a representative entity of the sector companies (such as a trade association, a GIE, an association ...).	Consortium Submit a project with a minimum expenditure of € 3 million. Fund The support provided by the state in projects is in the form of State aid consisting of mixed way of recoverable grants and advances. Selection is an ongoing process.	http://www.bpifrance.fr/Vivez-Bpifrance/Agenda/Appel-a-projets-PIAVE-9657	8to9
		Crédit impot recherche	fund for reasearch whatever the subject is	Private compagnies	http://www.entreprises.gouv.fr/politique-et-enjeux/credit-impot-innovation	8to9
		crédit impot innovation	fund for innivation whatever the subject is	Private compagnies	https://www.service-public.fr/professionnels-entreprises/vosdroits/F23533	8to9
11	Ministère de la recherche	PhD in university	all subjects			1to5
		Ph in a private sociéty : CIFRE	all subjects	Association with a private compagnie which can have financial deduction	http://www.enseignementsup-recherche.gouv.fr/cid22130/les-	3to5

					cifre.html	
12	CNRS	Projets Exploratoires Premier Soutien (PEPS) de site	Thematic result of discussions between the CNRS and local stakeholders (universities, schools, territorial and industry representatives). designed to support exploratory interdisciplinary projects. The procedure is very reactive to facilitate a quick start of the winning projects.	Fund: 10 k€	http://www.cnrs.fr/mi/spip.php?article8	1
13	coordonné par le CNRS-INSU : Financed by : INSU, InEE, InC, ANDRA, BRGM, CNES, IFREMER, IFSTTAR, INRA, IRD, IRSTEA, Fondation Coopération Scientifique ROVALTAIN, Météo France, Mission pour l'Interdisciplinarité du CNRS.	EC2CO : Initiative Structurante Ecosphère continentale et côtière	4 thematic actions (AT), each have its Scientific Committee: • BIOHEFECT: biogeochemistry, hydrology and ecosystem function • ECODYN: ecotoxicology, ecodynamics of contaminant • MICROBIAL: Environmental Microbiology • DRIL: Dynamics and Reactivity of Littoral Interfaces The evaluated projects must demonstrate their innovative role to test original and risky issues and structuring for example through the use of networked monitoring systems (SO, SOERE, test site, ...)	Fund 20k€ over 2 years	http://www.insu.cnrs.fr/ec2co	1
14	Etat	CASDAR	This call for projects aims to promote applied research quality, allowing in particular to value the achievements of basic research, conducted in partnership between public research and private operators, responding to the ambition to contribute to the development of varieties of seeds and plants for sustainable agriculture.	Consortium The projects must necessarily include a partnership between public research and private research. Fund The subsidy rate allocated to eligible projects is capped at 60% of the total project cost, excluding salaries of the civil service. The projects have a maximum duration of 3 years and 6 months.	http://agriculture.gouv.fr/appel-projet-casdar-2015-developper-des-varietes-des-semences-et-des-plants-repondant-lambition-dune	7to8
trans National						
1	SNOWMAN	SNOWMAN is a transnational group of research funding organizations and	Call in the field of soil sustainable management in Europe.	calls, open for appliant from participating countries	http://snowmannetwork.com/	

		administrations				
2	ANR	Generic project	accords de « lead agency » avec l'Allemagne (DFG), l'Autriche (FWF) et la Suisse (FNS). Les propositions de Projets de Recherche Collaborative – International (PRCI) avec ces pays doivent ainsi être déposées auprès de ces agences, en respectant les modalités de soumission en vigueur dans ces pays respectifs.			1to5
European						
1	EU	Horizon 2020 (and before EU Framework Programmes).	COLLABORATIVE PROJECTS.	A consortium must present a project based on notices published in the work programs defined by the European Commission. 2-3 projects are selected by subject, with defined budgets. Funds subsidies • up to 100% for R & D projects / research • 70% (+ 25% of indirect costs) for projects with work areas close to a market purpose (tests, prototypes, demos ..).	https://ec.europa.eu/programmes/horizon2020/	1to9
		SMEs INSTRUMENT		The purpose of this device is to focus on economic growth in contributing to the development of technologies with a level of maturity enabling placing on the market quickly. Eligible subjects are varied and are left to the initiative of the promoters. Funding method Grants up to 70% of eligible expenditure (25% of indirect costs).	https://ec.europa.eu/programmes/horizon2020/en/h2020-section/sme-instrument	7to9
		ETV : Environmental Technology Verification	trois domaines technologiques : - Surveillance et traitement de l'eau, - Matériaux, déchets et ressources, - Technologies de production de l'énergie.		http://ec.europa.eu/environment/etv/index.htm	8à9
		European structural funds	Structural Funds play a substantial role to help all regions build research and innovation capacities corresponding to their situation and priorities.		http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=structural_funds	

		Revolving funds	different funds. Examples: 1* some european structural funds, eg JESSICA (Joint European Support for Sustainable Investment in City Areas)	Labelled money. The investment should give revenues. The difference with an investment fund is that it should serve a public goal.	1* http://ec.europa.eu/regional_policy/index.cfm/en/funding/special-support-instruments/jessica/	
		European subsidies	Eg. for agricultural sector, European rural development programs			
		LIFE +	instrument under Horizon 2021	EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU	http://ec.europa.eu/environment/life/funding/life2015/	
		Wetsus, European centre of excellence for sustainable water technology	Wetsus is part of WaterCampus Leeuwarden. Wetsus is a facilitating intermediary and creates an environment and strategic cooperation for development of profitable and sustainable state of the art water treatment technology.	Infrastructure / research facilities are provided. Companies and research institutes from all over Europe that want to innovate join. Also the city and region participate (stimulating economic development of the region)	https://www.wetsus.nl/home/what-is-wetsus	
2	JPI	JPI - Joint Programming Initiatives	Member States commit to Joint Programming Initiatives (JPIs)	open for consortia of the contribbuting member states	http://ec.europa.eu/research/era/joint-programming_en.html	
		JPI OCEANS				
3	Interreg		financed by the European Regional Development Fund	helps regions of Europe share knowledge and transfer experience to improve regional policy	http://www.interreg4c.eu/	5to8
4	ERANET - European Research Area Network	instrument under Horizon 2020 ENSUF : ERA-NET Cofund Smart Urban Futures	Three call topics are defined: -Concepts and strategies for smart urban transformation, growth and shrinkage -New dynamics of public services -Inclusive, vibrant and accessible urban communities	instrument to support public-public partnerships in their preparation, establishment of networking structures, design, implementation and coordination of joint activities as well as topping up of single joint calls and of actions of a transnational nature	http://ec.europa.eu/research/era/era-net-in-horizon-2020_en.html	
		ERA-net Industrial Biotechnology (ERA-IB)	12 partner countries a joint call for research projects on biotechnology applied to purpose: "Industrial Biotechnology for Europe: an integrated approach". IWT (Flanders Belgium), Dasti (Denmark), ADEME (France), FNR (Germany), BMBF (Germany), NWO (Netherlands), NCR (Norway), NCBiR (Poland), FCT (Portugal), UEFISCDI (Romania) , FASIE (Russia), MINECO (Spain), TUBITAK (Turkey), TSB (UK) and BBSRC (UK).	Les consortia doivent être constitués d'au moins 3 équipes de 3 pays participants différents (précédemment cités) jusqu'à un maximum de 8 partenaires. La participation d'un partenaire industriel est obligatoire. Cet appel à projets se déroule en 2 étapes :	http://www.era-ib.net/	

		Partnership for Research and Innovation in the Mediterranean Area (PRIMA)	The goal of the Initiative is "To develop innovative solutions and promote their adoption for improving the efficiency and sustainability of food productions and water provision, in order to support an inclusive well-being and socio-economic development in the Mediterranean Area, within the framework of a reinforced Euro-Mediterranean co-operation", with the following objectives: 1.To enhance knowledge and unlock its innovation potential for food security and water availability through end user-friendly solutions in a context of ecological, demographic and climatic change 2.To advance existing knowledge and innovations for water and food quality and safety.		http://www.eranetmed.eu/index.php/prima-initiative	
		ARIMNet is an ERA-Net supported and funded by the 7th Framework Programme from 2008. The current second phase of ARIMNet will run from 2014 to 2017.	Use and management of natural ressources, Mediterranean basin		http://www.arimnet2.net/	
5	Baltic Organizations Network for Funding Science EEIG's	Joint Baltic Research Programme BONUS	BONUS brings together the research communities of marine, maritime, economical and societal research to address the major challenges faced by the Baltic Sea region. A full understanding of the Baltic Sea system is needed. This requires sound knowledge that is scientifically first-rate and relevant for society. The EU framework provides mechanism for combining national research funding and for using this in the work aiming to meet the challenges of today.		http://www.bonusportal.org/	

International						
	BELMONT forum		The Belmont Forum is a group of the world's major and emerging funders of global environmental change research. It aims to accelerate delivery of the environmental research needed to remove critical barriers to sustainability by aligning and mobilizing international resources. It pursues the goals set in the Belmont Challenge by adding value to existing national investments and supporting international partnerships in interdisciplinary and transdisciplinary scientific endeavors.	Consortium International consortia of researchers, consisting of partners from at least three of the participating countries, may apply for funding. Consortia should bring together natural scientists, social scientists, and research users (policy makers, regulators, NGOs, communities, and industry). Fund Under the Belmont Forum CRA Memorandum of Understanding, each Belmont Forum member funds researchers from their own country. Researchers from countries not participating in the Call may participate in a research project at their own expense.	http://www.belmontforum.org/	

7. Germany

Report by Uwe Ferber, Stephan Bartke, Detlef Grimski

7.1 Executive summary

7.1.1 English version

Societal challenges and needs:

In Germany, sustainable land use has been increasingly understood as a key challenge receiving attention for example by the national Sustainable Development Strategy that aims at limiting land-take to 30ha/day by 2020. It is regarded as a cross-sectional topic, in which most of the relevant societal challenges are closely interrelated. It is recognized that the on-going intensification of land-use conflicts cannot be solved by improving discipline-oriented management alone. The scarcity of the resource land requires calls for sufficiency strategies and circular land management to revitalise brownfields and reduce urban sprawl. Food security and secure water supply can only be achieved through a sustainable management of agriculture and ecosystems in rural areas. These are challenged by the increased intensification of traditional agricultural practices. Last not least, the underestimation of the importance of soils in the general public and policy making was noted as challenging towards a broad recognition of soil in it holistic meaning for ecosystems and the society.

Topics / research needs to be included in the SRA:

Nine research fields have been identified in Germany based on interviews and a national workshop with more than thirty national experts conducted in Berlin in 2015.

Sustainable land use can only be achieved through accepted frameworks and objectives related to sustainability, the active cooperation of the various stakeholders and an effective cross-sectional management of the actors involved. Conflicting objectives exist in all types of spaces, on all scales. The scientific basis for the adequate balancing of decisions is missing and sectorial and spatial regulations are not compatible enough with one another. Also the interdependency between the actors of land-use decisions has been only partially understood up until now. Therefore **"Actors in Land Use Transition / Cross Sectional Management and Communication"** has been identified as a first research field.

Land use, the development of settlement areas and natural compensations influence the living quality in urban areas. This raises a number of research questions in the field **"Settlement Area Management, Circular Land Management, Material Flows, and their Role related to Urban Climate Adaption"**. Next to the creation of a more solid science-foundation for land management, improvement of knowledge transfer and implementation in what is currently regarded as insufficient execution standards are stated research priorities.

Land-use transition through agricultural production and the development of the countryside settlement structure are closely related to one another and the rural ecosystem services. Particularly, demographic change leads to the loss of the cultivated landscapes and massive abandonment of residential, commercial and former agricultural structures, but it also offers chances for experiments, new users and uses. Research in the field of **"Rural Areas, Landscape Transition and Ecosystem Services"** is needed on management and

steering mechanisms, the development of the land/real estate market and environmental compensation measures linked to ecosystem services.

“Field Soil Quality and System Understanding” is another research field as soil quality equally affects the ecosystem cycle as well as the soil services. As an integrated whole, it connects insights into specific scientific soil research and is suited for the development and implementation of new pragmatic solutions and realizable concepts within the context of land use strategies as well as soil and land management. Various issues related to pragmatic and realizable concepts, to new solutions for land-use strategies as well as soil and land management may be derived from an improved basis understanding. Important aspects include securing of soil and soil protection, sequestration of carbon dioxide in the soil, the evaluation of material and energy flows and the consideration of the relation of users and migration patterns.

“Agricultural Ecological Systems” are challenged by an increasing demand for farm products, limited availability of resources, loss of biodiversity, and climate change. Therefore, it is necessary to expand the field of agricultural research, in which spaces are seen as economic, evaluation, planning and research units and where ecosystem services are introduced as a measure for evaluation. This includes research on plants, bioenergy, cultural landscapes and policy aspects ("Greening"). Also, modern technology (“precision farming“) can contribute to raising the efficiency of the processed nutritional and operation materials, while maintaining the high level of yields in connection with ecological points of reference.

Considering “sustainability”, land use has to be economically viable, ecologically compatible and socially acceptable to consider it as sustainable. Research is required on the conflicts arising from the various goals of **“Sustainable Development and Land Use“** and how to measure them. There is a demand for improving the methods of sustainability assessment as well as for fostering the implementation of an evidence-based, transparent evaluation of sustainability for land-use decision-making from local to regional development.

Integrated research on **“Land Use in River Basins”** is currently being developed. This includes quantitative (e.g. polders) as well as qualitative aspects (diffused pollution input) of land use as well as the effects of regulation demands, such as the EU Water Framework Directive.

The analysis and evaluation of land use and land-use transition is hampered by the various existing definitions and missing or not openly available sources of information. **“Indicators, Information Bases and Monitoring”** are required to improve the evaluation of qualitative and quantitative aspects of land-take and to study land-use transition in urban and rural areas, including new technological means such as remote sensing or mobile applications in the context of “citizen science” related to topics such as land-take or soil quality.

A **“Global Perspective”** for the impact of land use is often too short-sighted, even if the public is increasingly recognizing global aspects, such as “Land sharing/land sparing”, "Land Grabbing" or "Food security", of land use as a societal challenge. Therefore holistic assessments and integrated strategies and concepts are in demand.

Experiences regarding the connection of science to policy/practice:

Research for sustainable land development should provide better information, evaluation methods as well as planning and decision-making tools for future oriented actions and should deliver innovative solutions for a sustainable society. In Germany the concept of inter- and transdisciplinary research is currently a central theme in the running research programmes.

The improved diffusion of theoretical and conception aspects into the transdisciplinary methods was reiterated by the interview partners.. Solutions range from the substitution of individual research with a dialog oriented consulting process, the co-creation of knowledge or the co-designing of solutions with practice-oriented partners, the inclusion of a broad range of stakeholders and the development of new concepts for the involvement of the public.

The carrying-out of applied research programmes was seen by practice-oriented representatives as a chance to influence research and the application of scientific knowledge. As a consequence of this funding philosophy the municipalities are key to be involved in sustainability research.

National and transnational funding schemes:

The majority of the interview partners evaluated the German research funding landscape for the research field of land use as being exemplary and innovative with regard to the inter- and transdisciplinary methods applied.

Within the context of the interviews, representatives of public and private research funders, such as the Federal Ministry of Education and Research, the Federal Ministry of Environment, Nature Conservation, Building and Nuclear Safety, the German Research Foundation, Volkswagen Foundation or BASF, will follow the INSPIRATION process of developing a strategic research agenda.

7.1.2 German version

Gesellschaftliche Herausforderungen und Forschungsbedarf:

Nachhaltiges Boden- und Flächenmanagement wird zunehmend in Deutschland als wichtige Herausforderung anerkannt. Dies kommt etwa im 30ha/-Ziel zur Minderung der Flächeninanspruchnahme in der Nationalen Nachhaltigkeitsstrategie zum Ausdruck. Das Thema ist als Querschnittsaufgabe zu betrachten, die Bezüge zu unterschiedlichen gesellschaftlichen Herausforderungen aufweist. Die zunehmenden Anforderungen an die Landnutzung verschärfen Nutzungskonflikte und müssen durch eine integrative und diszplinenübergreifende Betrachtungsweise angegangen werden. Die Knappheit der Ressourcen Boden und Fläche erfordert Suffizienzstrategien bei der Inanspruchnahme von Land und die Etablierung einer Flächenkreislaufwirtschaft. Im ländlichen Raum kann die Sicherheit der Nahrungsmittelversorgung und der Schutz des Wassers ebenfalls nur durch ein nachhaltiges Management von "Agrarökosystemen" gewährleistet werden. Dies stellt große Herausforderungen an die traditionelle Landwirtschaft.

Nicht zuletzt ist kritisch, dass die Wahrnehmung des Bodens in der öffentlichen Wahrnehmung und bei politischen Entscheidungsträgern noch zu gering ist, um ihn in seiner ganzheitlichen Bedeutung für das Ökosystem und die Gesellschaft zu erfassen.

Themen und Forschungsbedarfe für die strategische Forschungsagenda:

Insgesamt neun Forschungsfelder wurden in Deutschland auf der Grundlage von Experteninterviews und dem nationalen Workshop mit mehr als 30 Teilnehmenden im Oktober 2015 in Berlin identifiziert.

Nachhaltige Landnutzung erfordert eine effektive Kommunikation, das aktive Mitwirken der zahlreichen Stakeholder und ein effektives Schnittstellenmanagement der Akteure. Zielkonflikte, die in allen Räumen und auf allen Maßstabsebenen bestehen, können dadurch überwunden werden. Defizite sind sowohl bei den wissenschaftlichen Grundlagen zur Entscheidungsunterstützung, bei planerischen Abwägungsprozessen als auch in der effektiven Abstimmung sektoraler Fachplanungen und räumlicher Zielsysteme erkennbar. Zudem sind Wechsel-wirkungen zwischen den Akteuren von Landnutzungsentscheidungen bisher nur unzureichend verstanden. Vor diesen Hintergrund wurde das Forschungsfeld „Akteure, Schnittstellenmanagement und Kommunikation“ aufgerufen.

Die Lebensqualität in urbanen Gebieten wird unter anderem von der Flächennutzung und der Siedlungsflächenentwicklung beeinflusst. Daraus resultieren eine Reihe weiterer Forschungsbedarfe im Feld „Bauleitplanung, Flächenkreislauf-wirtschaft, Stoffströme und Klimawandelanpassung“. Neben der Verbesserung wissenschaftlicher Grundlagen für das Flächenmanagement kann Forschung dazu beitragen, den Wissenstransfer und einen effektiven Vollzug zu unterstützen.

Der durch die Landwirtschaft induzierte Landnutzungswandel und die Entwicklung der ländlichen Siedlungsstrukturen sind eng miteinander und mit den ländlichen Ökosystemleistungen verknüpft. Insbesondere Folgen des demographischen Wandels zeigen sich in den ländlichen Räumen durch einen Verlust an Kulturlandschaft und massivem Leerstand von Wohngebäuden, Gewerbeimmobilien und ehemals landwirtschaftlich genutzten Bauten. Allerdings bieten sich zugleich auch neue Spielräume und Chancen für neue Nutzer und Nutzungen. Das Forschungsfeld „Ländliche Räume, Landschaftswandel und Ökosystemdienst-leistungen“ umfasst das Monitoring und Management ländlicher Räume, die Entwicklung der Bodenmärkte sowie ökologischer Ausgleichsmaßnahmen im Kontext der Ökosystemleistungen.

Das Forschungsfeld „Bodenqualität und Systemverständnis” umfasst die Bodenqualität, ökosystemare Funktionen und Leistungen des Bodens gleichermaßen. Es verbindet als integrative Größe Erkenntnisse bodenwissenschaftlicher Spezialforschungen und ist geeignet, pragmatische und umsetzbare Konzepte und neue Lösungen im Kontext von Landnutzungsstrategien sowie von Boden- und Flächenmanagement zu entwickeln und zu implementieren. Wichtige Themenfelder hierzu sind u.a. Bodenerhaltung und Bodenschutz, Kohlenstoffsequestrierung in Böden, Agrarökosystemmanagement und eine nachhaltige Intensivierung der Landnutzung, die Bewertung von Stoff- und Energieflüssen und die Einbeziehung des Verbraucherverhaltens sowie von Migrationsbewegungen.

„Agrarökosysteme“ stehen im Spannungsfeld von steigendem Bedarf an Agrarprodukten, der Verknappung der Ressourcen (insb. Landwirtschaftsfläche), dem Verlust von Biodiversität und den Anpassungserfordernissen an den Klimawandel. In der Konsequenz ist eine Erweiterung der agrarwissenschaftlichen Forschung notwendig, indem Räume als Wirtschafts-, Bewertungs-, Planungs- und Forschungseinheit gesehen und Ökosystemdiensleistungen als Bewertungsmaßstab eingeführt werden. Dies schliest die

Pflanzenforschung, Forschungen zur Bioenergie, Kulturlandschaften und politikrelevante Felder, wie das "Greening" mit ein. Auch moderne Technologien ("Precision Farming") könnten wesentlich zu einer Effizienzsteigerung eingesetzter Nährstoffe und Betriebsmittel bei gleichbleibend hohen Erträgen unter Einbeziehung ökologischer Gesichtspunkte beitragen.

Dem Verständnis der Nachhaltigkeit folgend muss eine „nachhaltige Entwicklung und Landnutzung“ zugleich möglichst ökonomisch rentierlich und ökologisch verträglich sowie gesellschaftlich akzeptiert sein. Forschungsbedarf besteht hinsichtlich der Messbarkeit und Bewertung von Zielkonflikten konkreter Landnutzungsentscheidungen sowie deren Wirkung. Es fehlen Bewertungs- und Zielsysteme, die in der Lage sind, mit Zielkonflikten in verschiedenen Raum-Zeit-Kontexten umzugehen.

Integrative Forschungen zur „Landnutzung in Flusseinzugsgebieten“ stehen noch am Anfang. Dies betrifft quantitative (z. Bsp. Polder) wie qualitative Aspekte (z. Bsp. diffuser Schadstoffeintrag) der Landnutzung sowie die Auswirkung regulativer Anforderungen, wie der EU Wasserrahmenrichtlichtlinie.

Die Analyse und Bewertung der Landnutzung und des Landnutzungswandels wird durch unterschiedliche Definitionen und fehlende bzw. nicht öffentlich zugängliche Daten erschwert. „Indikatoren, Informationsgrundlagen und Monitoring“ sind erforderlich, um quantitative und qualitative Aspekte der Flächeninanspruchnahme zu erfassen. Die Analyse und Bewertung des Landnutzungswandels und der zukünftig zu erwartenden Trends ist zu verbessern. Darüber hinaus sollten neue technische Möglichkeiten durch Fernerkundung sowie Apps im Rahmen von „Citizen Science" und „Big Data“ auf ihre Eignung für die Themen Flächeninanspruchnahme und Bodenqualität geprüft werden.

Eine „Globale Perspektive“ auf die Wirkungszusammenhänge der Landnutzung kommt oftmals zu kurz obwohl diese Zusammenhänge als gesellschaftliche Herausforderung zunehmend auch öffentlich wahrgenommen werden. Die Forschungsfelder müssen durchgehend im europäischen und internationalen Kontext betrachtet werden. Beispiele hierfür sind Schlagworte des „Land sharing/land sparing“, „Land Grabbing“, „Nahrungsmittel-sicherheit“. Hierfür werden ganzheitliche Strategien und integrierte Konzepte eingefordert.

Erfahrungen zum Wissenstransfer Forschung/Politik/Praxis:

Forschung zur nachhaltigen Landnutzung sollte verbesserte Informations-grundlagen, Evaluierungsmethoden und Planungs- und Entscheidungssysteme bereitstellen, um damit einen Beitrag zu innovativen Lösungen des Landmanagements zu leisten. Dies wird in Deutschland mit inter- und trans-disziplinärer Forschung angegangen. Die Interviewpartner weisen darauf hin, dass so ein verbesserter Wissenstransfer sichergestellt werden kann. Weitergehende Vorschläge reichen hin zur Substitution von eigenständiger Forschung durch dialogorientierte Beratung, die „Co-Creation of Knowledge“ oder das „Co-Design of solutions" mit Praxispartnern und einer breiten Anzahl zu beteiligender Stakeholder sowie die Entwicklung neuer Konzepte zur Beteiligung der Öffentlichkeit. Von Seiten der Praxisvertreter wird die Durchführung von angewandten Forschungsvorhaben als aktive Möglichkeit zur Einflussnahme auf Forschung und die Umsetzung wissenschaftlichen Wissens angesehen. Eine frühe Einbindung von kommunalen Partnern ist für eine aktive Mitwirkung von Praxispartnern und eine Umsetzung von Forschungsergebnisse von zentraler Bedeutung.

Nationale und transnationale Forschungsförderung:

Der überwiegende Teil der Interviewpartner schätzte die deutsche Forschungslandschaft im Bereich der Landnutzung mit Blick auf die Akzentuierung von inter- und transdisziplinärer Forschung als Vorreiter ein. Die befragten Vertreter von Forschungsförderorganisationen, wie dem Bundesministerium für Bildung und Forschung (BMBF), dem Bundesministeriums für Umwelt, Naturschutz, Bau und Reaktorsicherheit (BMUB), der Deutschen Forschungsgemeinschaft (DFG), der Volkswagenstiftung und der BASF, werden den INSPIRATION Prozess zur Erarbeitung einer strategischen Forschungsagenda weiter konstruktiv begleiten.

7.2 Methodology followed

The strategic research and innovation needs for Germany are based on 32 expert interviews and a national workshop with 31 participants from a diverse set of organisations including private and public research funders, end-users, scientists and societal interest groups related to soil, land-use and land management. The interviews were based on the INSPIRATION template and were conducted between August and October 2015. The two-day national workshop was based on a discussion paper, which summarized the outcomes of the interviews. In total, twelve research fields were identified to be of multi-stakeholder interest and relevance. These fields and related specific research topics were discussed each in 45 minutes workshop session with sub-groups of 10-20 participants. Each session was guided by a facilitator and based on a ten minute introduction by a participant, who acted as an advocate for the respective area (having been identified based on respective statements in the interviews). Other potential research fields identified in the interviews were presented on posters and participants were asked to either include them in the discussions on the twelve main fields or to raise them as a separate area – there was no need stated for the latter. The figure below illustrates a first assessment of the importance of these different research topics as discussed in the national workshop in Berlin in October 2015. In addition, aspects of Science-Policy-Interface and Funding were discussed with all participants.

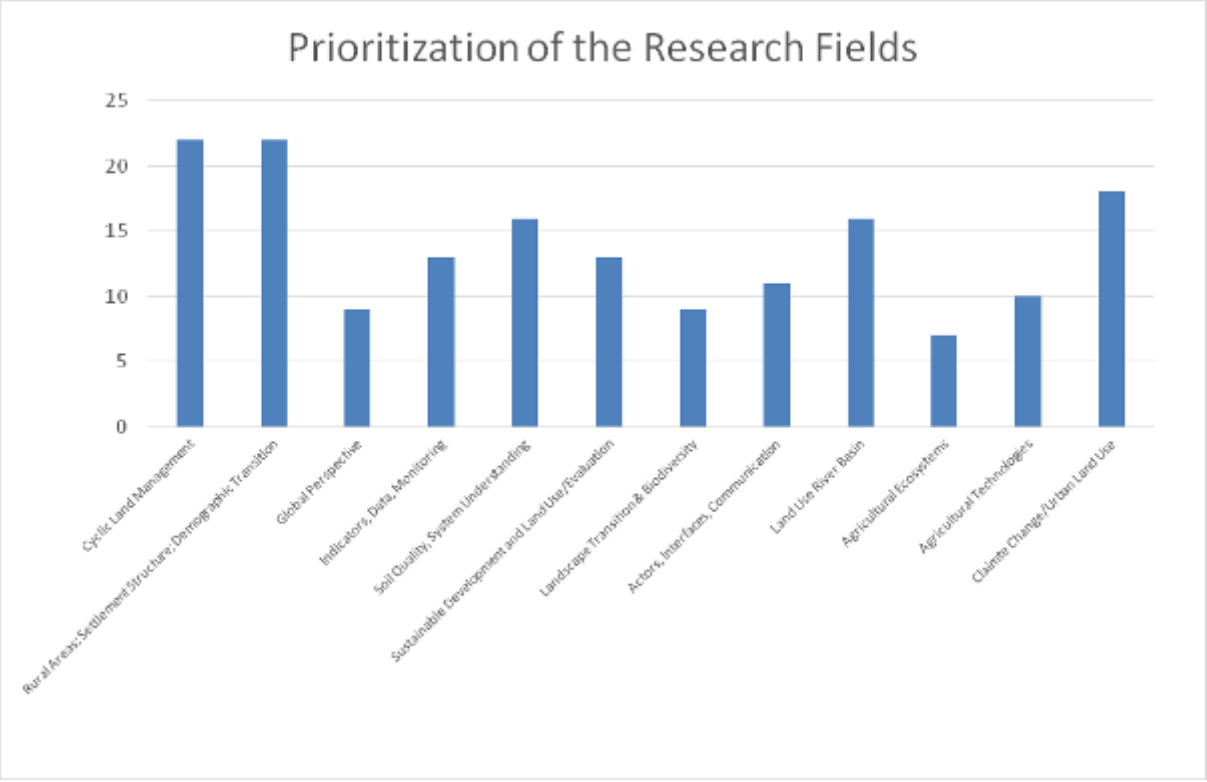


Figure: Interim research field assessment for Germany based on national workshop.

The workshop results were documented in a draft D5.2 German report, which was open for consultation between 15th December 2015 and 15th January 2016. Feedback and inputs form several participants as well as later on from the IAB have been integrated into the final version. Recommendations on a stronger focus and on less topics led to finally nine research fields stated for Germany.

DE-1: Research Field “Actors in Land Use Transition / Cross Sectional Management and Communication”

DE-2: Research Field “Settlement Area Management, Circular Land Management, Material Flows, Urban Climate Adaption”

DE-3: Research Field “Rural areas, Landscape Transition and Ecosystem Services”

DE-4: Research Field “Soil Quality and System Understanding”

DE-5: Research Field “Agricultural Ecological Systems”

DE-6: Research Field “Sustainable Development and Land Use“

DE-7: Research Field “Land Use in River Basins“

DE-8: Research Field “Indicators, Information Basis and Monitoring“

DE-9: Research Field “Global Perspective“

7.3 Research and Innovation (R&I) needs

7.3.1 Societal challenges and needs

As an introduction to the engagement process with stakeholders, societal challenges reflecting the policy priorities of the Europe 2020 strategy and addressing major concerns shared by citizens in Europe and elsewhere[12] were introduced. Those challenges identified for Europe also were overwhelmingly agreed upon during the discussion with the German interview partners.

Notwithstanding, several more specific issues were expressed in addition by individuals. These challenges represent to a certain extent the background and respectively the interests of stakeholders in the soil, land-use and land management topics, such as in relation to food security from the representatives of the industry and agricultural sectors to give one example.

In Germany, also the current research funding programme FONA³ - Research for Sustainable Development refers to global societal challenges, such as climate change, the loss of biodiversity, land degradation and a lack of resources while at the same time securing social cohesion and our standard of living.[13]

The objectives of the EU 2020 Strategy With regard to sustainable land use, the strategy would be could lead to an intensification of land-use conflicts, which cannot be alone solved by improving discipline-oriented management. The scarcity of land as a resource requires dealing with sufficiency strategies, yet these are currently hardly mentioned in existing research. The question of sufficiency is continuously underestimated in the considerations made regarding the invention of new technological solutions.

Indeed, according to several interview partners, sustainable land use is a key challenge and deserves high attention. It is regarded as a cross sectional topic, in which most of the relevant societal challenges are closely interrelated. For example, food security and secure water supply can only be achieved through a sustainable management of agriculture and ecosystems. These are challenged by the increased intensification of traditional agricultural practices. It was also noted as challenging that soil is currently not seen and understood in a holistic way – recognizing for example also its regulatory and provisioning services. Soil is simply present and is not really appreciated by the majority of people. Investments in information and sensitivity training are required.

[12] https://ec.europa.eu/programmes/horizon2020/en/h2020-section/societal-challenges
[13] http://www.fona.de/en/17833

7.3.2 Topics / research needs to include in the SRA

DE-1: Research Field "Actors in Land Use Transition / Cross Sectional Management and Communication"

DE-1.1 Actors and Cross Sectional Management CM 3

Sustainable land use can only be achieved through accepted frameworks and objectives related to sustainability, the active cooperation of the various stakeholders and an effective cross sectional management of the actors involved. Land use is mainly influenced by the decisions of private and public actors who weigh decisions according to individual decision patterns (Walsh, Knieling 2014). These are partially influenced by sectoral and planning and regulation strategies. Conflicting objectives exist in all types of spaces, on all scales and they reach beyond the set of instruments of spatial planning as "mutual spatial management process". (Walsh, Knieling 2014) These conflicts exist, because the scientific basis for the adequate balancing of decisions is missing and sectoral and spatial vision systems are not compatible enough with one another. Also the interdependency between the actors of land use decisions has been only partially understood up until now and a strong demand exists for empirical research.

For this reason, research should clear up the following aspects:

- How do political sustainability goals (for example the SDGs) and regional/municipal spatial planning goals influence the practical land use decisions of actors and land use itself?
- Which actors are relevant to be considered and which interdependencies exist between them?
- What effects do sectoral expert planning (transportation, agricultural systems, nature protection…) have on land use decisions and how can they be integrated into spatial planning and development?
- What instruments have a trans-border effect and how can these be incorporated into existing/new European initiatives and departmental politics?
- Which level of planning is the most effective for the strategic application of planning instruments for the purposes of steering land use? How do higher levels of planning affect this (such as state/regional planning)?

This research is related to the INSPIRATION Conceptual Model (CM) 3 "Land management", because cross sectional management of actors is crucial for effective implementation of sustainable land use.

DE-1.2: Communication CM1/2/3/4

The public is not well enough informed when it comes to the environmental medium of soil. Associations related to the topics of nature, planning and engineering are rarely connected. Also, public communication, as recently being supported by the “international year of soils”, is not able to inform and mobilize actors on the topic of land use in a ground-breaking way. In general it would be ideal, similar to the topic of climate protection, to touch upon measures and initiatives on the global level on the topic of soil protection. Through the explanation of the following questions, research should be able to contribute to this goal:

- How can new media and technology, for example social media with a “soil function app”, be used to engage with the broader public?
- What innovative evaluation instruments can support awareness raising (example sustainable shopping cart, ecological footprint “land” for food production, etc.)?
- Which existing and new instruments can be used to raise the understanding of land use decisions in the public realm and with which instruments and indicators/parameters can the transparency of the effects be measured? What is the influence on planning and permission granting decisions?
- How can science contribute to the dialog about the use interests of actors (for example between representatives of nature protection and agriculture), for example through the differentiated evaluation of large and small agricultural units as well as the regional context?

Communication issues are essentially related to all themes of the CM, but in particular to themes 1 “Resource demand and efficiency” and 3 “Land management” as these both are concerned with the direct demands and impacts of society regarding natural capital and ecosystem services, this means here communication can have immediate effects on soil, land use and land management.

DE-2: Research Field "Settlement Area Management, Circular Land Management, Material Flows, Urban Climate Adaption"

Land use and the development of the settlement area influence the living quality found in urban areas. Both are in a state of constant transition in relation to expansion, density and use type and this has effects on soil and city climate. Conflicting goals are manifold, urban areas have to use brownfield sites for new constructions and at the same time become more resilient to climate change by increasing the amount of green areas. This raises a number of research questions, the answers to which can contribute to the creation of a solid foundation for land management, as well as considerations of knowledge transfer and the implementation of support for what is currently regarded as insufficient execution standards. The regional framework conditions for these considerations are greatly different in Germany.

- Growing areas are faced with the duty of mobilizing land potentials despite strong competition for use
- Stagnant or shrinking regions have a surplus of land potentials which require concepts of deconstruction and the re-naturalisation of land.

DE-2.1: Cicular Land Management (CM3)

In this context, the Circular Land Management (Ferber, Preuss: 2008) presents a comprehensive strategic approach for steering the development of settlement structures. The aim of the approach is rooted in the implementation of the land-related policy of the sustainability strategy of the Federal Government with a double strategy of safeguarding quality by preserving undeveloped outskirt areas through the development of inner areas. Circular land management also offers a starting point for the achievement of the international goals related to a "no-net-land-degradation" on the level of the EU and the UN. Furthermore, circular land management can contribute to the implementation of strategies for climate adaption and "healthy" cities. Research is required to understand the patterns of behavior and interdependencies of actors active in land-related policy areas. Examples include:

- Which causes are responsible for the consumption of land (for example private investments, city development or investment-oriented assistance programs)?
- How can stakeholders, especially landowners, be included in the circular land management to support integrated action plans?

DE-2.2 Settlement Area Management and Environmental Compensation (CM1,3)

Inner development in gaps in the built-up areas, brownfield regeneration, densification and replacement constructions are measures that confront municipalities with a number of challenges. These challenges include the establishment of new forms of cooperation between planning and environmental agencies, the adaption of planning and administrational processes to current demands and at the same time the development of management strategies in cooperation with private land owners. There are often conflicting goals in the revitalization of land regarding regulations related to nature and species protection and the potential presence of biotopes on degraded and abandoned land. The research questions resulting from these considerations are:

- How can the requirements of nature protection, especially species protection, be weighted and integrated in inner urban areas?
- How can the requirements of soil protection be integrated into the weighting of planning decisions, especially in sight of brownfield redevelopment with the aim of reducing the consumption of land in outskirt areas as well as soil-related compensation measures? (Stronger consideration of hemeroby concepts and climate impacts of natural sites)
- What scales and standards are to be used in the evaluation/weighting of spatial decision processes and conflicts? (especially in relation to the environmental medium of soil and (bio) agriculture)
- Development of uniform scales for compensation actions

Furthermore, through the new delineation of new settlement areas, an effect of “double compensation“ can currently be observed, which is characterized by the urban consumption of soil on the one hand and through the compensation measures undertaken on agricultural land on the other hand. Alternative mechanisms of compensation which do not create an effect of double soil consumption should be developed.

It is also important to better understand the integrated impacts of settlement reconstruction and land recycling and close existing research deficits in these areas. Research questions of interest here are:

- How can “settlement efficiency” be defined and quantitatively improved?
- What effects does demographic change have on the delineation of new single family housing districts and how can the current reconstruction of the settlement from the 1960s and 70s (west Germany/Europe) minimize the consumption of land?
- What risks and cost factors have to be considered in the preparation of land parcels for construction and what impact do these have on the cost factors and structures for land recycling? (deconstruction cost, planning safety and approach to restrictions, for example the long-term ground water treatment)
- What impacts can be achieved through instruments of loss prevention, such as in the regulation for the reduced liability for contaminations for new investors in the new federal states and what effects could be expected from the expansion of these instruments?

DE-2.3 Material Flows (CM1,3)

In recent years, the approach undertaken by land recycling for soil and waste material management has led to a problem for land recycling. Individual cases instead of larger systematic solutions raise the cost of land recycling. For this reason the issue of “land recycling” should be more closely connected to questions raised by energy and resource efficiency. Research is required for the following questions:

- What are the requirements of the material cycle management system for the use of construction materials and removed soil in relation to energy and resource efficiency?
- Can life cycle analyses be developed for construction materials and with this understanding new instruments be developed for, for example, the requirement of the reuse of construction materials?

DE-2.4 Operative land management (CM3)

The study of single plots and single cases is also not adequate in relation to the **mobilization** of land. Instruments are still missing for a comprehensive spatial and portfolio oriented analysis. The renovation of deficient properties beyond the borders of the land plots is encouraged along with the goal of minimizing development risks. It has to be considered how land planning can develop towards land development management for example through "Reallabore" – applying the concept of real world experiments[14]. In this context the existing experience with land acquisition funds, development agencies and land management agencies has to be evaluated and systematically considered through the work of research. The further development of the instruments of soil management is also required. The central and overarching research question is:

- How can an operative land management function?

DE-2.5: Urban Climate Adaption (CM 2,3)

A central topic for urban areas is the resilience of settlement structures in sight of **climate change** and the increase of extreme weather events (overheating, flooding, drought …). Research dedicated to natural sciences, soil function maps, as well as the related city structure frameworks and pilot applications are present in Germany and are subject of ongoing research activities. However, current concepts are almost exclusively restricted to local specific impact factors and are burdened by conflicting goals as well as deficits in the weighting and implementation. Conflicting goals and weighting deficiencies exists in the quality of the density and compactness of the city. The interdependency of city density (densification versus the maintenance of open spaces) is especially under-researched. The following research questions are of interest:

- How can city structure frameworks be adapted and communicated?
- What methodological approach and content is required for concepts of climate change adaption?
- How can urban chains of reaction (thermal/hydro) be better understood?
- What planning tools are appropriate to display the interdependencies of city structural density?
- What basis does soil offer for a planning tool to address climate change? (Soil function evaluation)
- What would concepts of a “double inner development”, whose goal it would be to connect and qualitatively improve the actions of ensuring the maintenance of urban open spaces and their use on the one hand and the development of available inner city plots on the other hand, look like?
- Are there innovative ownership and maintenance concepts for (to be created) public green spaces?

[14] Cf. for example Gross, M., & Hoffmann-Riem, H. (2005). Ecological restoration as a real-world experiment: designing robust implementation strategies in an urban environment. *Public Understanding of Science*, 14(3), 269-284.

Many of the mentioned topics cannot be exclusively worked upon on the municipal level and require the recognition of the city – rural context. The following related research questions are:

- How can the development of settlement areas in the context of various European planning systems be steered on the regional (city) level and the distortion of the competitive field through “land dumping” actions be reduced?
- What are the overall effects of the “catching up” sub-urbanisation in the new German federal state and eastern European countries on the development of settlement structures?
- How can growth and shrinkage be balanced?
- The development of instruments to disregard non-usable sites from the cycle of use.

In summary, it is important to combine the strategies and instruments of circular land management through applied research and pilot case studies and in the sense of modular “tool boxes” to qualify a sustainable land management. Since many European standards are affected by this, this action should take place on the European level.

DE-3: Research Field “Rural areas, Landscape Transition and Ecosystem Services”

Land use transition through agricultural production and the development of the rural settlement structure are closely related to one another. The effects of the demographic change are especially noticeable in rural areas. It is leading to the loss of the cultivated landscapes in many rural areas, increasing the severity of the population decrease and ageing and it has resulted in massive abandonment of residential, commercial and former agricultural structures. These developments will also have an economic effect. However, they also offer new chances and room for experimentation for new users and uses, which, through the engagement of various citizens, are increasingly being utilized.

DE-3.1 Rural areas (CM1)

There is an overall research deficit in the fields of planning, management and steering mechanisms in rural areas. New guidance frameworks are required which are decoupled from the agricultural economic perspective and can direct the creation of independent development perspectives for villages and small cities in rural regions. The spatial planning system of central places used for the securing of a common standard of life quality must be further examined in relation to this issue and be further developed in "Reallabore", as seen in the Internationale Bauausstellung Thüringen – an international architecture exhibition – or the Reallabore in the Black Forrest region.

This especially concerns the research questions of

- Which good examples for the development of rural areas are existing on the national/international level and how do they operate? What is generalizable and can be learned from these examples?
- What concepts and tools are required for the adaption of existing and planned settlement areas in shrinking rural regions and which instruments are required for the support of decision-making in this regard? (example the further development of follow-up cost studies)
- How are rural spaces affected by the current migration movements (in the context of demographic change, but also refugees) and how do they affect land use? How can planning react to these aspects?
- Can research support or contribute to the improvement of concepts of inter-communality and stability in rural spaces?

DE-3.2 Land/real estate market (CM3)

The development of the land/real estate market in rural spaces is critical for the socio-economic perspective – the decrease in prices for settlement structures on the one hand and the increase in price for rural land on the other hand. Land resources are becoming an object of speculation on the global scale. In Germany, high land prices are already discouraging agricultural operations, especially in cases of organic farming. Thus, the following aspects require consideration in research projects:

- Which new instruments for soil planning in rural areas are required (for example the overcoming of "Realerbteilung" (gavelkind), continuation of the consolidation of land, relocation processes) in order to secure the interest of nature and landscape conservation as well as a locally socially responsible use of soil?
- How can sectoral and spatial assistance programmes, especially the various directions and areas for agriculture, be better coordinated with one another?
- What would a monitoring concept with a focus on natural science and social evaluation and assessment of land use transition, which keeps the contexts of agricultural structural transition and demographic change on an equally footing to one another, look like?
- How can dynamic scenarios for land use transition be displayed as a contribution to expert and spatial planning?

DE-3.3 Landscape transition (CM1,2)

Landscapes in Germany are influenced by a strong pressure towards change due to land use transition. This development is characterized by aspects such as consolidation of lots, expansion of settlement areas, the concentration of agriculture all the way to the current effects of the energy transtion. Traditional cultivated landscapes are being lost and new landscape types are being developed. Land use competition, which is already present in the peri-urban areas of growth regions, is also increasing in rural areas. Wildlife networks which are spatially surrounded by similar areas valuable for protection, which are potentially within a close functional proximity with one another, are especially endangered. Biodiversity is decreasing. The research question related to these aspects are:

- Which steering instruments are suitable for influencing the form of the landscape within the context of the “energy transition” in rural areas?
- How can land use be controlled for the purpose of energy use?
- How can the concept of “green and blue infrastructure” be sharpened on the conceptual level and be carried into a transboundary dimension?
- How can wildlife networks be seen as an important starting point for the future derivation of reconnections?
- What optimizations are possible in the development of tools for land use transition, impact studies and material flow models?

- What communication and legal instruments can support “cooperative nature protection”?

DE-3.4 Compensation (CM3)

The arrangement of nature protection related compensation regulations also play an important role within the context of the German discussion and induces research demand. Instruments such as nature protection compensation measures are critically received due to the consumption of agricultural land.

- On which level would the impact/compensation process in transportation projects most efficiently take place (what role does spatial planning play)? Which effects can be expected from natural restoration as opposed to purely monetary compensation mechanisms (probelmatic with soils)? (exchange about European practice)
- How can biodiversity be raised through the bundling of sectoral compensation requirements from various EU framework directives (environmental liability directive, environmental impact assessment directive)?
- Can compensation measures be aimed towards the revitalization and renaturalisation of brownfields?
- How can the various compensation practices in Germany be evaluated?

DE-3.5 Ecosystem services (CM1)

In the light of the overview of the problems present in rural areas and the resulting societal challenges that are related to these, there is hope that a foundational paradigm change and strategic starting point from which to steer land use in rural areas can be created through the recognition and evaluation of ecosystem services. In particular, the functions and services of soil can be evaluated with ecosystem services and be understood as a foundation for knowledge diffusion and decision-making. For this to happen, ecosystem services must be evaluated in combination with, for example, regulation services (e.g. microclimate regulation), the importance of soil functions (in line with the natural sciences) as well as socio-economic services. Research questions are:

- How can sectoral approaches of agricultural research and general research be connected to the topic of ecosystem services?
- What impact does agriculture have upon the landscape and how can the integration of production and ecosystem services be improved?
- What importance do ecosystem services have in their relations to one another? Ecosystem services should be considered together and standards and/or indicators should be developed. In order for this to happen, synergies and ecosystem services trade-offs must be understood.
- How can the “bundle” of ecosystem services be gathered and evaluated (overview of social, ecological and economic ecological services)? The combination of various types of ecosystem services is important to be considered, since the services they provide are widely different and can have a significant effect on soil quality.

In summary, research should consider and help change the transition taking place in rural areas as well as support the actors, especially the citizens, with intergrated methods. Promising forms of research are offered in the form of transdisciplinary methods as well as the research of transformation (establishments of "Reallabore")

DE-4: Research "Field Soil Quality and System Understanding"

DE-4.1 Soil Quality (CM2)

Soil quality equally affects the ecosystem cycle as well as the use functions of soil. As an integrated whole, it connects insights into specific scientific soil research and is suited for the development and implmentation of new pragmatic solutions and realizable concepts within the context of land use strategies as well as soil and land management. In this regard, soil research in Germany already provides a sufficient foundation which recognises soil as a highly complex 3-phased (soild, fluid and gas phases) and a 4-dimensional (space and time) medium, and this understanding is the starting point for the definition of an improved system understanding. Soil, as a central foundation of life and non-renewable resource, serves a role in all of the seven societal challenges of Horizon 2020. The following central questions are of upmost importance:

- How can we maintain soil quality in Europe and worldwide (system understanding) and how can we secure the status (monitoring)? The maintenance of our soil as a foundation of life is a central aspect of all areas of current and future social challenges. This considers firstmost the sectors of health, nutrition and bioeconomics, energy and climate. Even the transportation sector, which uses soil as a carrier of its infrastructure, is connected to soil, as well as questions related to societal and personal freedom, security and quality of life. In order to use soil quality and its preservation as central mesures for the evaluation of sustaianble land use strategies, soil quality must be quantified and evaluated. This is possible with the current state of research and upon the foundation of European data structures and networks. The securing of the maintainence of soil quality can be acheived through the use of modern monitoring technologies, e.g. in the area of remote sensing.
- When will system boundares of soil quality be exceeded, e.g. intensive uses (system understanding) and can we quantify these (tipping points)? System boundaries together with questions of soil quality can be put into relation to landscapes and regions whose natural capital is an important feature of the present soil quality. Administrational and fuctional areas also create specific system boundaries. These can include, amoung others, land use demands, operational framework conditions and relevant issues of nature protection. System boundaries in this case are the framework conditions for the maintainence of soil quality. Their study and qualitative analysis of the function of excessive use allow for the evaluation of system boundaries as an important steering mechanism for soil and land managment.

DE-4.2 System Understanding (CM2,4)

Various research questions which could have an influence upon pragmatic and realizable concepts and new solutions in the context of land use strategies as well as soil and land management may be derived from this basis understanding. Important topics in relation to this are, among others, securing of soil and soil protection, sequestration of carbon dioxide in the soil, the evaluation of material and energy flows and the consideration of the relation of users and migration patterns. The following research question are of importance:

- What effects do climate change and climate extremes (erosion events and the loss of humus, intrusion of materials beyond system boundaries) have upon the quality of

soil and how can we quantify and foresee these effects? How can we connect soil quality goals such as erosion protection and carbon dioxide sequestration to each other and integrate them into land use concepts? What potentials exist to reach out to various societal groups for the securing of the soil quality and to integrate them into the evaluation process of soil quality?

- What quantitative threshold values exist for the securing of soil quality and how can we quantify and integrate these into a sustainable soil and land management? In this context, how can we better understand the ecological structures of soil organisms and the role they play in the maintenance of soil quality and in turn use this understanding?
- Which processes play a role for the soil and water quality in the soil-sediment-water system boundaries and can they be quantified? How far can soil sediments be used for the securing and improvement of the soil and water quality within the framework of land improvement measures?
- What potentials do cyclic-soil approaches have to offer for the maintenance of soil quality and can these approaches be implemented in new land use strategies, even beyond system boundaries in relation to the city-rural sphere? Can the deregulation of methods and the changing of assistance mechanisms offer new potentials for the securing of soil quality and for the sustainable intensification of land use?
- How can soil quality goals take into consideration the anthropological input of harmful soil material and create a transparent basis for the evaluation of soil pollution as well as create the respective pollution-related measures for the various sources of these elements? How can soil quality be renovated and degraded land areas be brought back to value again?
- What contributions to an improved system understanding can offer experimental approaches (Ecotron, FACE/FATE units, long-term study, experimental agricultural operations, Reallabore)?

DE-5: Research Field: Agricultural Ecological Systems

DE-5.1: Agricultural ecological systems (CM 1,2,4)

Ecological systems are challenged by a raising demand for agricultural products, the limited availability of resources, the loss the biodiversity and climate change. Therefore, it is necessary to expand the field of agricultural research, in which spaces are seen as economic, evaluation, planning and research units and where ecosystem services are introduced as a measure for evaluation. Production strategies must be produced in connection with these, which are directly related to landscapes in the region and that recognize the relevant socio-economic and agricultural political framework.

The duty of research is to compare the usefulness of older methods (“Methusalem”) versus innovative methods to find solutions to current issues and to change the rules of “good agricultural practice” towards that of sustainable agricultural production. This requires an improved basis of information, in which research is required for:

- The evaluation of current soil conditions (potentials, degradation, eutrophication): new evaluation of area based soil information (maps, potential types). Soil information services as a duty of the national, European and international levels.
- Integrated analysis of production, functional structures, material and energy flows as an initial priority focus for sustainable agricultural production. Introduction of ecosystem services as a key indicator.
- Interregional evaluation of processes (material, energy, economy). Scientific and able to be communicated (footprints)

DE-5.2 Plant research (CM2)

There are close interdependencies to the field of plant research. In this context the potential of cultivated plants to raise yield productions can be used in an environmentally friendly context in view of ecosystem conditions. In relation to the energy transiton taking place in Germany and the related stronger use of renewable energy sources, the following research questions are to be posed, such as:

- What risks are associated with the creation of renewable energy sources in view of land use competition and a changing agricultural practice (example of consequences for the plant yield with high corn content)?
- What steering parameters are suitable for a qualitative and quantitative production of biomass product? (Protection of cultural landscapes? Maintenance of biodiversity?)
- How can unwanted effects to the quality of the soil and the neighbouring environments be minimized?

DE-5.3 Sustainable Agricultural Ecological Systems (1,2,4)

Also, organic agricultural practices can support the development of sustainable agricultural ecological systems. In this case the following research questions need to be answered:

- What contribution can organic agriculture offer to increase yields and granting food security?

- How can the non-uniform administrational practices within the various federal states (for example standards in the regulation on "flower mix" be altered to support large scale and integrated analysis?
- Can goal conflicts be better understood (analyzed) and perhaps balanced through the implementation of Reallabore, e.g. conventional agriculture and biodiversity?
- How can the pressure be minimized upon (organic) agriculture and/or the small scale agricultural production, which is characteristic of certain landscapes (rental, sale, sharing deals)? What effects do price dynamics have (e.g. land as “slurry deposit“)?
- How can areas with a slope be secured/renovated for a sustainable use?

DE-5.4 Greening policy (CM3,4)

On the other side one must consider practice. Demands of agricultural and forest production, goals of nature protection and the designing of the landscape are being handled in systems generally separate from each other, such as the systems for planning, administration and decision-making. Use conflicts, such as those of food security and nature protection are increasing. This begs the question as to how conventional agricultural production with high yield values is to be operated in the future under the consideration of biodiversity aspects as well as how the resources of water and soil can be better protected. **Greening** in the practical field in not connected to the integrated goals of land use (e.g. landscape, biodiversity, maintenance of the cultural landscape). Large operations dominate and follow internal optimization strategies. Research questions here are:

- How can the lack of useful land use steering instruments in the field of agricultural production be overcome?
- How can improved spatial information and planning foundations be made available and improved monitoring approaches be created?
- How can demands from the political level be based upon better scientific evidence and contribute to an improved level of planning security?
- Are new instruments for soil management of agricultural land required? (e.g. first to have the opportunity to buy during the transfer of ownership of agricultural land, minimization of speculation, prohibition of concentrations)
- What are the effects of regulation/deregulation? (for example financial compensation and agricultural policy of the EU and the ERDF funding) beyond individual sectors?
- What happens to the rural areas when one choses to withdraw from sectoral funding sources? Discussion on the public assistance. Large operational structures / units would be strengthened, small ones weakened. Analysis of the interdependencies important here.

DE-5.5 Agricultural Technology (CM1)

Also, modern technology (“precision farming“) can greatly contribute to the raising of efficiency of the processed nutritional and operation materials, while maintaining the high level of yields in connection with ecological points of reference. The long-term shortage of plant food requires a new thinking in the use of resources, especially in relation to phosphor and potassium. Research questions here are:

- What potentials are offered by remote sensing by satellite?
- What developments in the technology are required in agriculture? E.g. use of drones
- How can the shortage of plant food nutrients be addressed?
- What are the development perspectives for agricultural factories (hydroponic) and what effects do they have upon land use?
- How can organic farming contribute (reduction of fertilizer / raised ability of plants to take in nutrients) and how can organic farming accompany transdisciplinary research assistance?

DE-6: Research Field "Sustainable Development and Land Use"

DE-6.1: Goals and Monitoring (CM 2,4)

Land use can serve various demands – however at the same time it is restricted in its ability to satisfy all demands at the same time. According to the understanding of sustainable development (WCED 1987 "Our common Future" [Brundlandt Report]) land use has to be economically viable and ecologically compatible as well as socially acceptable to be able to be considered as sustainable. But how are these demands to be valued in the evaluation of specific land use decisions? Which actors are deemed able to determine with which instruments, what it is which will be considered within the dimensions of an evaluation, how the results will be aggregated and what end results can be considered as a sustainable form of land use? Evaluation and objective-forming systems able to address conflicting goals of various spatial-time-contexts are missing. Research is required for the following questions:

- What conflicts arise from the various goals of sustainable development?
- What formal and informal institutions and what levels of governance are to be addressed (SDGs, grand challenges, national, regional, local goals)?
- How/with whom can an appropriate system of development goals by created?
- How can global goals (SDGs) in the national and regional level be broken down and established?
- What interdependencies exist with other regions/sectors?
- How can spill-over effects (interdependencies with other regions/sectors) be understood?

DE-6.2: Land Use Evaluation Methods (CM 4)

There is also a demand in the methods of sustainable evaluation for a continual and future-oriented dynamic of analysis and evaluation.

- How can analysis and evaluation methods be dynamically organized and monitoring systems and statistics be adapted to this to enable a continual process of sustainability evaluation? (Keyword of follow-up monitoring)
- How can ecological, social (including cultural) and economic evaluation methods be integrated and what potentials are offered by the concept of ecosystem services and where are the gaps?
- How can concepts such as resiliency, sufficiency, vulnerability be integrated into the evaluation of sustainability?
- How can various timescales (long-term, short-term) be integrated into the sustainability effects of land use decisions?
- How can various spatial scales (landscape, region, nation, Europe...) be integrated into the sustainability effects of land use decisions?
- How can external development trends (politics, for example organic economic strategy, demography, demand and costs, technological development) be better anticipated for and their effect upon the small scale be analyzed? What interdependencies exist?

- What potentials are there to use the analysis of historical land use and development for improved future-oriented sustainability strategies?
- How can methods be designed so that the participation of the public is possible?

DE-6.3: Sustainable Land Use Implementation (CM2,4)

The implementation of an evidence-based, transparent evaluation of sustainability for the decision-making process require:

- Sustainability evaluation as a further development of the prognosis of the follow-up of technical systems (for example implementable for bioeconomy)
- Sustainability evaluation as an instrument for the development of policy (impact assessment); important connections to ex-ante, monitoring, ex-post and as an instrument of user information (certification and labeling of specific products)
- As an instrument of regional development
- As an instrument for foresight and the prognosis of follow-up effects

DE-7: Research Field "Land Use in River Basins" (CM 2)

Integrated research on land use in river basins is currently being developed. This includes quantitative (e.g. diked land) as well as qualitative aspects (diffused pollution input) of land use as well as the effects of regulation demands, such as the EU Water Framework Directive. Example: Intrusion of surface waters through point-based or area-based study, especially in relation to land related anthropological burdens. Research questions include:

- Which land uses can take place in diked land, use and agricultural use in diked land areas (area pollution inputs/soil quality/saline content)?
- What are sustainable strategies for (existing) settlement structures in areas subject to flood hazard?
- Develop incentives for users/economic compensation models for agricultural use of dike areas
- How does the transportation of sediment material take place (erosion, sediment transfer, depositing and remobilization), quantification and dynamic of the rainwater run-off?

DE-8: Research Field "Indicators, Information Basis and Monitoring"

DE-8.1: Indicators (CM4)

The analysis and evaluation of land use and land use transition is hampered by the various existing definitions and missing and/or not openly available sources of information. The result of this is a deficiency in the quality and comparison of information related to site analysis, analysis and evaluation of land use transition and the trends which can be expected in the future. This is especially true of the goal set in the global sustainability strategy[15] of a "land degradation neutral world" which requires further concrete and measureable indicators.

The indicator used in Germany as a description for the development of the settlement area, "development of the settlement and transportation area" is generally seen as to be appropriate as well as in need of updating. Research is still required for assigning the inner municipal development potentials which must be analyzed and forecasted on the national level (and Europe-wide) and should also be better integrated into the existing systems of spatial monitoring and the cadastral system.

However, further indicators are required in relation to climate change and soil quality. Research approaches for the following research questions are required:

- Which indicators can improve the evaluation of qualitative and quantitative aspects of the consumption of land and study land use transition in urban and rural areas?
- How can the quality and comparability of the information basis for site analysis, data analysis and evaluation of land use transitions and the related trends be secured along with establishing connections to structural changes in the agricultural landscape (example agriculture: integrated administrational and control system – InVeKoS), energy transition, use transition in existing settlement structures, and transportation planning-induced use changes.
- Is an internationalization of the German model for classification of potentials, use changes and demographic changes as currently developed by BBSR meaningful?

[15] https://sustainabledevelopment.un.org

DE-8.2 Monitoring technologies (CM 4)

Furthermore, new technological methods of remote sensing as well as mobile applications in the context of “citizen science” should be studied in terms of their relation to the topics of land consumption and soil quality. This requires scientific support for legal instruments to support the collection of information through private means and to secure access of this information to allow for it to then be used by research.

Direct uses resulting from research can be gained from:

- The analysis of soil sealing via remote sensing
- Legal analysis in relation to the collection of data and granting of access to the data for diverse stakeholders
- Methods for the combination of land information with soil information.

DE-9: Research Field “Global Perspective“ (CM4)

Even the public is increasingly recognizing global themes of land use as a societal challenge and strategies and concepts are in demand. Consideration for the presented research areas must be ongoing in the European and international context. In this context, Germany - with the support of the already developed competence areas in the research field of land use - is in an advantageous position to take an international leadership role. This includes especially for example,

- Land sharing/land sparing strategies: how can a division of functions between natural conservation and agricultural production be considered on the global level? (relevant to the level of ethical consideration and to also be included)
- Research field “Land Grabbing”: What are the aims of the effects of the globalization of the local good of land? Which strategies are required on which levels? (ref. the topic of climate change)
- How can a systematic consideration, including aspects of ethical, economic and social nature, be undertaken?
- In relation to water deficiency: up until today, this issue has not been solved through technological solutions such as conventional desalinization plants, which are unaffordable.
- Can an intensification of agricultural production help to close the gap?
- Development of a "Soil Stewardship council" for the development of suitable methods of sustainable development in agricultural production.

7.4 Experiences regarding connection science to policy/practice

7.4.1 Use of knowledge

Scientific knowledge on land use science has transitioned from fact or phenomenon based observation to searching for an integrative understanding of land use dynamics that goes beyond the limits of disciplinary knowledge and sectorial viewpoints (Zeischler, Rogge, 2014). The German INSPIRATION interview partners largely agreed with this point of view. Research for sustainable development should provide better information, evaluation methods as well as planning and decision-making tools for future oriented actions and should deliver innovative solutions for a sustainable society to support sustainability research in Germany.

As stated in the FONA programme: "Research for sustainable development should develop innovative solutions for these challenges and deliver decision-making tools for future oriented action. The spectrum covers everything from basic research to the development of application ready solutions."[16] An example for this was the REFINA programme 2004 - 2008 "Research for the Reduction of Land Consumption and for Sustainable Land Management", which was like FONA funded by the Federal Ministry of Education and Research (BMBF). REFINA was part of the German National Strategy for Sustainable Development and supported the development and testing of innovative concepts for the reduction of land consumption in order to provide a scientifically reliable basis for decisions and measures. Research on land use has been exploring integrated strategies for land use and soil.[17]

In the application of existing and wide-ranging scientific knowledge, largely developed by universities and research institutions in the previous years, there is still recognition of existing gaps in the field of knowledge-transfer. In relation to this, the interview partners were critical about the following aspects:

- New scientific results are often separated from questions of practical application and even new legislation is not able to compensate for the discrepancies in practical application.
- Integrated research approaches do produce valuable new products for the practical sphere, however these are then often used by sectoral organisations in the public sector and in this manner the “end user” cannot be properly addressed,
- Scientific literature is commonly not available in public and administrative organisations and is rarely used by practice-oriented partners,
- Conferences and educational events in Germany are overwhelmingly catered towards specific disciplinary communities. In this manner, presentations from INSPIRATION are presented at various types of conventions, which leads to the result that the topic is not reflected upon in an integrated manner but instead in relation to a specific sectoral perspective,
- The participation in European/international research conferences is largely not possible for representatives responsible for implementation, especially those of the public administration due to financial reasons.

[16] http://www.fona.de/en/framework
[17] http://www.refina-info.de

In this context, the application of scientific knowledge should be improved in the practical arena. The BMBF aims to strengthen the initiative and involvement of municipalities in research and innovation in the framework of transdisciplinary research approaches with the "Innovative Municipality" programme (Kommune innovative)[18]. "In this manner the municipalities and municipal departments are the first actors involved in sustainability research. The chances for the long-term application are greatly increased when new ideas and solutions are initiated with the cooperation of the municipalities and the scientific community. Creative and innovation friendly actors in the public arena should be granted the opportunity to realize new ideas in cooperation with the scientific community".[19]

The improved diffusion of theoretical and conception aspects into the transdisciplinary methods was reiterated by the interview partners from the academic background. Solutions range from the substitution of individual research with a dialog oriented consulting process, the co-creation of knowledge or the co-designing of solutions with practice-oriented partners, the inclusion of a broad range of stakeholders and the development of new concepts for the involvement of the public. These aspects are being heavily discussed in US American research communities. For this to take place, a new understanding of the "integration" of all disciplines related to land use is required.

The INSPIRATION project aims to supply such an exemplary method through the application of the chosen bottom-up process.[20]

[18] https://www.fona.de/en/17800

[19] https://www.bmbf.de/foerderungen/bekanntmachung.php?B=959

[20] Cf. Brils J et al. (2015): Template for national information collation. Update 1 version as of 02.07.2015 of deliverable D2.3 of the HORIZON 2020 project INSPIRATION. EC Grant agreement no: 642372, UBA: Dessau-Roßlau, Germany.

7.4.2 Possibilities to set the agenda

The majority of the interview partners, as well as a few practice-oriented partners along with the research institution representatives, were involved in the preparation of research programs. This includes work made by the DFG Board and the advisory boards of private foundations all the way to the direct role in the preparation of research programs and the evaluation of projects undertaken within the framework of the BMBF research funding program. Many participants were directly involved in the political supervision, for example as a representative of an association, and were thus able to use research results. In this respect, a deficit in the German research arena was especially noticed for the topic of land management.

The carrying-out of applied research programs was seen by practice-oriented representatives as an active chance to influence research and the application of scientific knowledge. The early involvement of municipal partners is of central importance for the active cooperation of practice-oriented partners and the application of research results. In general the “German research and administrational culture” was seen as to be “technical oriented”. Integrated problem solving and nature friendly methods were critically received and seen as difficult-to-implement projects by scientific decision advisory boards. Despite the positive methods of challenge-addressing and implementation-oriented research programs of the ministries for research or for the environment (BMBF and BMUB), the majority of research funding is oriented towards sectoral programs, for example conventional agriculture or the sectoral funding of transportation. Societal challenges are not properly addressed.

One imminent research problem is presented by the discontinuity of projects which commonly only run for 2-3 years. Long-term perspectives and the necessary structural changes are near-to-impossible to achieve within these timeframes. The processes of application submission and research project selection require a high level of predetermined agreements. Processes which do not coincide with these agreements are unrealizable, innovation that could be gained from new insights are hindered from the start.

Representatives from the private research arena mention the dominance of internal business networks, which is difficult to overcome for the purposes of inter-business cooperation. Undefined future research topics are hardly addressed, low reaction of the industrial research in relation to societal challenges (Germany/world-wide), for example the topic of food security is hardly discussed in Germany and also receives little attention in the debates about land use conflicts. Private businesses mention a successful method of knowledge transfer from research into practice can be found in the form of demonstration projects with those responsible for application, for example model operations of agriculture supported by scientific input.

7.4.3 Science – policy – practice

As already mentioned, the majority of the interview partners are already involved in the formulation of scientific research questions and/or are involved in research themselves. The use of research projects in the practical application and guidance of political decision-making is especially important in Germany. For example, political strategies and funding programs related to the reduction of land consumption have been supported and guided since the 1990s (Federal Environmental Agency / Environmental research plan, BBSR (ExWoSt "Fläche im Kreis", Federal Ministry of Education and Research / Refina, Innovation Groups).

The development of market-ready products was not a main focus of any of the interview partners, with the exception of the representatives from private institutions. This is a recognized deficit. (Gustedt)

The concept of inter- and transdisciplinary research is currently a central theme in the running research programs in Germany. As a consequence of this funding philosophy, private actors are becoming active in the evaluation and selection of research projects and are important practice-oriented partners.

Innovative methods to "science – policy – practice"

BMBF "Sustainable Land Management" innovation groups

The Federal Ministry for Education and Research (BMBF) is funding nine scientific-practice-teams that have combined into Innovation Groups. Until 2019, they will be developing future-focused and applicable solutions for handling land as a vitally important resource. http://innovationsgruppen-landmanagement.de/en/

Reallabore

"Reallabore" with a thematic connection to land use were implemented within the context of the Internationale Bauaustellung Thuringia (IBA) as well as in Baden-Württemberg. In "Reallabore", scientific community members become involved in real transformation processes. They support activities such as for example the renovation of city districts or the introduction of new mobility and energy systems. Practice-oriented actors from municipalities, social and environmental organizations or businesses are included in research processes from the beginning in "reallaboren". Research questions coming from an environmental association, an energy association, a bicycle club or even a technology business can therefore be considered. Open-ended knowledge, which is to have a direct impact in the field of implementation is a type of result to be achieved through the process. https://mwk.baden-wuerttemberg.de/de/forschung/forschungspolitik/wissenschaft-fuer-nachhaltigkeit/reallabore/

BFN-Research-Practice Project

Testing and development processes can be initiated and applied by practice-oriented partner within the context of the BFN research funding program. A preliminary study is undertaken by the BFN to determine the decision criteria to be implemented by a practice-oriented partner and supported through scientific input by the BFN. For example, compensation measures/ecological credit account with the State of Brandenburg.

7.5 National and transnational funding schemes

The majority of the interview partners evaluated the German research funding landscape for the research field of land use as being exemplary and innovative in view of the inter- and transdisciplinary methods applied. European research assistance has only been used by a few of the interview partners and is generally seen as relatively resource intensive and associated with higher levels of risk, especially during the phase of application submission.

The interview partners did not mention thematic gaps in the research funding programs. The reason for this is the possibility to address the topics discussed in Sub-Chapter 2 within the context of running programs and/or program consultations. The short project timespans as well as the inadequate possibilities to finance empirical studies of land use were seen as a deficit.

Within the context of the interviews, the representatives of public and private research funding organizations stated questions related to the topic of research assistance. An overview of the results ist gathered in the following table.

	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
Regional				
1	Real labs	Baden-Würtemberg	Urban and rural develoment	https://mwk.baden-wuerttemberg.de/de/forschung/forschungspolitik/wissenschaft-fuer-nachhaltigkeit/reallabore/
National				
1	Research for Sustainable Development (Fona)	Federal Ministry of Education and Research (BMBF)	FONA³ with initiatives on land innovation groups	www.fona.de
2	German Research Foundation (DFG)	German Research Foundation (DFG)	Cross cutting topic of different departments and decision-making commissions (Life science/Engineering)	www.dfg.de
3	Environmental research plan	Federal Ministry of Environment	Different topics related toland management	www.uba.de
4	Sustainable Land Use program	Volkswagen foundation	Demonstration projects - calls by detailed topics	www.volkswagenstiftung.de
6	Differnent land related topics e.g. nitrogen in agriculture	German Environmental foundation	Demonstration projects - calls by detailed topics	www.dbu.de
7	Reseach on sustainable agriculture	BASF	Industry research	www.basf.de
European				
1	see NL +			
2	Urban innovative actions	DG REGIO	Demonstration projects - calls by detailed topics	http://www.uia-initiative.eu/
3	URBACT	DG REGIO	City networking	www.urbact.eu
International				
1	GIZ	internal research	International co-operation projects	www.giz.de

7.6 Annexes

Annex Ia: NKS interviews in Germany

Date of Inter-view	Organisation	Interview	funder	end user	Knowl-edge provider	Nat.reg.l oc. author-ity	Univ./ re-search inst	SME /consult ant	Busi-ness & industry	NGO	network	other	soil	sedi-ment	water	land use-manage ment
03.06	Leibniz-Zentrum für Agrarlandschafts-forschung e. V.	Thomas Weith			1		1									1
04.06	Deutsches Institut für Urbanistik (DIFU)	Thomas Preuss			1		1									1
24.06	BASF SE	Folkert Bauer	1	1					1				1			
20.07	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit	Rolf Bräuer	1			1							1			1
20.07	Rat für Nachhaltige Entwicklung (RNE)	Isolde Magin-Konietzka		1								1	1			1
23.07	Akademie für Raumforschung und Landesplanung (ARL) 5 R Competence Network	Barbara Warner, Evelyn Gustedt			2		2									2
27.07	Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie (LfULG)	Bernd Siemer		1		1							1			

31.07	Landeshauptstadt Stuttgart, Amt für Umweltschutz	Hermann Josef Kirchholtes		1		1									1
06.08	Bundesamt für Naturschutz	Mathias Herbert	1	1		1						1			1
26.08	Helmholtz-Zentrum für Umweltforschung – UFZ Kommission Bodenschutz (KBU)	Bernd Hansjürgens			1		1				1	1			1
27.08	Deutsche Bodenkundliche Gesellschaft Universität Tübingen	Thomas Scholten			1		1				1	1			
04.09	Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- und Verbraucher-schutz (MKULNV)	Wilhelm König		1		1									1
04.09	Dresden International University KBU	Franz Makeschin		1	1		1				1	1			
04.09	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit	Andreas Bieber		1		1						1			
07.09	Bundesinstitut für Bau- Stadt- und Raumforschung	Fabian Dosch, Giesela Beckmann, Janna Hoymann	1	1	1	1	2								3

07.09	Bundesamt für Geowissenschaften und Rohstoffe	Eberhard Einen			1	1							1	1		
07.09	Bundesverband Boden	Maike Bosold			1						1		1			
08.09	Deutsche Forschungsgemeinschaft (DFG)	Patricia Schmitz-Möller	1									1				1
09.09	Universität Gießen	Hans Georg Frede			1		1						1			
11.09	HAW Hamburg	Susanne Heise			1		1							1		
21.09	Forschungszentrum Jülich GmbH	Kristina Gross	1									1				1
21.09	NABU - Naturschutzbund Deutschland eV.	Steffi Ober		1						1						1
22.09	Leibniz-Zentrum für Agrarlandschaftsforschung e. V. HNE Eberswalde	Katharina Helming			1		1						1			
24.09	Umweltbundesamt	Detlef Grimski, Stephan Bartke, Frank Glante	1	1	1	1	1				1		1			2
30.09	European Land and Soil Alliance	Detlef Gerdts		1							1		1			
09.10	Bundesverband der Landesentwicklungsgesellschaften	Anna Strattmann		1							1					1
09.10	Bundesverband gemeinnütziger Landgesellschaften (BLG)	Karl-Heinz Goetz		1							1					1

Annex Ib: NKS interviews in Germany

Organisation	Workhop	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
Leibniz-Zentrum für Agrarlandschaftsforschung e. V.	Thomas Weith			1		1									1
Deutsches Institut für Urbanistik (DIFU)	Thomas Preuss			1		1									1
BASF SE	Folkert Bauer	1	1					1				1			
Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit	Rolf Bräuer	1			1							1			1
Rat für Nachhaltige Entwicklung (RNE)	Isolde Magin-Konietzka, Alina Ruppelt		2								2	1			1
Akademie für Raumforschung und Landesplanung (ARL®) 5 R Competence Network	Barbara Warner, Dennis Ehm			2		2									2
Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie (LfULG)	Bernd Siemer		1		1							1			
Landeshauptstadt Stuttgart, Amt für Umweltschutz	Hermann Josef Kirchholtes		1		1										1
Helmholtz-Zentrum für Umweltforschung – UFZ Kommission Bodenschutz (KBU)	Bernd Hansjürgens; Christope Schröter-Schlaak			2		2					1	1			1

Deutsche Bodenkundliche Gesellschaft Universität Tübingen	Thomas Scholten			1		1				1		1			
Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- und Verbraucherschutz (MKULNV)	Wilhelm König		1		1										1
Dresden International University KBU	Franz Makeschin		1	1		1					1	1			
Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit	Andreas Bieber		1		1							1			
Bundesverband Boden	Maike Bosold		1	1						1		1			
HAW Hamburg	Susanne Heise			1		1							1		
Forschungszentrum Jülich GmbH	Kristina Gross, Ingo Fitting	2									2	1			1
NABU - Naturschutzbund Deutschland eV.	Steffi Ober		1						1					1	
Leibniz-Zentrum für Agrarlandschaftsforschung e. V. HNE Eberswalde	Katharina Helming			1		1						1			
Umweltbundesamt CABERNET ITVA KBU	Detlef Grimski, Stephan Bartke, Frank Glante	1	1	1	1	1				1		1			2
European Land and Soil Alliance	Detlef Gerdts		1							1		1			

Bundesverband gemeinnütziger Landgesellschaften (BLG)	Karl-Heinz Goetz		1							1					1
Deutsches Zentrum für Luft- und Raumfahrt (DLR)	Eric Borg			1		1									1
Deutsche Gesellschaft für internationale Zusammenarbeit	Dieter Nill	1									1				1
Stadt+	Uwe Ferber		1	1			1								1
IBA Thüringen	Bertram Schiffers	1	1	1							1				1
Bundesanstalt für Immobilienaufgaben (BIMA)	Martin Jürgens	1	1		1										1
Volkswagenstiftung	Franz Dettenwanger	1									1				1

Annex IIa: Sources

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Annex IIb: Science Policy Interface documents

FONA³

Recent Science Policy Interface documents in Germany have been developed under the responsibility of the Federal Ministry of Education and Research (BMBF) under the key program "Research for Sustainable Development **FONA³**" (Quelle) http://www.fona.de/en/17833 Collaborating in the fields of science, economics, politics and civil society, an agenda process refined the programme and identified new research priorities. The core of the programme will consist of three flagship initiatives: Green Economy, the City of the Future and the Energy Transition in Germany. BMBF will be working on these core elements together with other federal and state departments, allowing the results to have a direct effect on their decision-making processes. The flagships are also designed to be application-oriented, and will involve the inclusion of stakeholders such as businesses and local communities in the research process at defined points. The overall aim is to support implementation processes and, by doing so, to stimulate sustainable development.

The FONA-Framework Programme represents the implementation of the German National Sustainability Strategy and the Federal Governments High-Tech Strategy. Under the sustainability strategy, the federal government has pledged to reduce CO_2 emissions by 40 per cent as compared to 1990 emission levels by 2020. In addition, the share of renewable energy is set to reach 20 per cent as well as a doubling of energy productivity by 2020 as compared to 1990. This applies to resource productivity as well, e.g. land consumption will be reduced from 130ha to 30ha per day.

Council for sustainable development: Soil protection

The Council for Sustainable Development has formulated the requirements for soil protection in the “A New Political Approach to Sustainability Requirements for Land Use in Europe” position paper from 2014 and has also recommended the creation of a world-wide “soil stewardship council”. This should collect the efforts for the development of select methods of a sustainable development in the agriculture and develop methods and indicators. The methodological approaches should be further developed within the framework of a soil stewardship and be used for operational sustainability management.

Zukunftsstadt

As part of FONA3 the National Platform Zukunftwerkstadt: Strategic Research and Innovation Agenda the CO2 neutral, energy/resource efficient and climate adapted city 2015. Developing upon the vision of a CO2 neutral, energy and resource efficient and climate adapted, adaptable and livable city of the future, the Federal Government, in cooperation with the Federal Ministry of Education and Research (BMBF), for the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), for Federal Ministry for Economic Affairs and Energy (BMWi) and for the Federal Ministry of Transport and Digital Infrastructure (BMVI) called into life the „National Platform Zukunftsstadt“ (NPZ). The goal of the NPZ is for the common development of an interdepartmental strategic FINA, with the goal to improve the coordination of running and future research programs with each other, to connect them better with one another, and to identify new research demands in the context of the named challenges.

Thematic connections to land use are:

- The recognition of the key role of land in a city/region as a non-renewable resource and the complex user interactions between city and region, such as for example for the regional production of food and energy sources, or the urban water cycle.
- Climate friendly city redevelopment: development of strategies of city redevelopment in growing and shrinking regions and inner development potentials, securing of green area quality, improvement of central urban spaces and of city historical preservation P.410
- Integrated and sectoral vulnerability and risk analysis, which in coordination with various environmental media
- And spatial uses, for example through the further development of simulation tools
- Urban green infrastructure(UGI) are the foundation for a strategic planning application for the development of multifunctional green and blue infrastrutures. 54
- Cross secotral management in city planning in respect to the creation and improvement of ventilation routes, green zones, waterways and flood areas as well as new operation models and forms of finance
- Open data: collection and organisation of municipal experiences.

Acatech 2013

The German Academy for Technical Science (acatech) in 2013 published the "Recommendations for a Collection of the Scientific Component in Soil and Land Management" document. The document includes an overall analysis of the resource "soil" and its role as an ecosystem service and economic factor. Societal challenges, such as climate change, food provision and energy supply were presented. Acatc demands "interdisciplinary research". It is important for research in the field of soil and land management to address these land use challenges. As a result of their historical development, the scientific disciplines in this area are extremely wide-ranging and this is reflected in the structural diversity of the relevant research institutions in Germany. The result of this is that this subject area receives different degrees of attention from different research institutions. However, the new circumstances facing us today require strategic coordination of research topics and comprehensive, interdisciplinary responses – something that Germany's fragmented research community is currently in no position to provide. It is therefore imperative for German soil scientists to undertake interdisciplinary cooperation on the key research topics.

- More should be done to highlight the economic and social importance of soil as a finite geological resource at a national, European and global level
- Land productivity should be increased without impairing ecosystem services
- Land management practice should be adjusted to ensure a rapid response to the effects of climate change and innovative approaches should be developed for managing competition between different soil and land uses
- A consensus should be built regarding key research priorities
- Technical expertise should be pooled and interdisciplinary institutional cooperation between the relevant actors and stakeholders in Germany should be promoted
- Measures should be taken to ensure knowledge and technology transfer from the scientific community to businesses and

DFG Senate Commission on Agroecosystem Research

The Senate Commission on Agroecosystem Research has developed a foundational paper for the research agenda titled “Sustainable and resource-efficient intensification of crop production: perspectives of agroecosystem research."(DFG, 2014) With this foundational paper, the Senate Commission presented the perspectives for the foundational research of sustainable intensification of cultivated plant production. The main call to action by the Senate Commission is for the extension of the agricultural scientifical perspective. The evaluation of the relation between input and yield, which is mostly focused upon single crop types, must be expanded to include considerations for the potentials offered by the spatial and temporal diversification of production systems in relation to the local context, the context of the landscape as well as aspects of climate change. Production strategies adapted to entire landscapes and regions as well as in respect to relevant socio-economic and agricultural political contexts must be developed in order to tie in ecosystem services. In this context, the Senate Commission recommends three interdisciplinary research priority topics for the intensification of resource efficiency of land productivity:

- Full use of the potentials of crop cultures for the environmentally friendly yield increase in the context of ecosystem requirements.
- Sustainable intensification of the plant production in the context of the landscape
- Economic, societal and political dimension of yield increases of crop cultures.

Annex IIIa: Workshop Agenda

INSPIRATION Nationaler Key Stakeholder Workshop - Deutschland

Boden – Fläche – Landnutzung:
Was sind die Forschungsthemen und -strategien der Zukunft?

13.-14. Oktober 2015 – in den Räumen der Helmholtz Gemeinschaft Berlin
SpreePalais am Dom, Anna-Louisa-Karsch-Straße 2, 10178 Berlin

13. Oktober 2015

12.15 Uhr Ankunft – Registrierung, informelles Kennenlernen, leichter Mittagsimbiss

13.00 Uhr Begrüßung und Einführung zu INSPIRATION

13.15 Uhr Der Weg zur Europäischen Forschungsagenda „Boden-Fläche-Landnutzung“ – Hintergrund und Zielstellung des Workshops

13.30 Uhr Vorstellungsrunde der Teilnehmer/-innen

14.00 Uhr Überblick zu Interim-Ergebnissen der Interviews und Erhebung in Deutschland

14.30 Uhr Kaffee/Tee-Pause

15.00 Uhr Diskussionsrunden zu Forschungsfeldern in Kleingruppen

18.15 Uhr Kurze Zusammenfassung des Tages

20.00 Uhr Informeller Austausch und gemeinsames Abendessen in der Cocktailbar Oase, Georgenstraße 184, 10117 Berlin

14. Oktober 2015

08.30 Uhr Begrüßung und informeller Austausch

08:45 Uhr Fortsetzung Diskussionsrunden zu Forschungsfeldern in Kleingruppen

10.30 Uhr Kaffee/Tee Pause

11.00 Uhr Vorstellung und Diskussion / Evaluation der Kleingruppenergebnisse im Plenum und Priorisierung der Ergebnisse als Input für die strategische Forschungsagenda

12.45 Uhr Mittagessen

13.30 Uhr Auswertung der Priorisierung der Forschungsfelder

13.40 Uhr Nationale und europäische Fördermöglichkeiten: Diskussion zu Finanzierungs-instrumenten zur Forschungsförderung und zu Implementierungs-herausforderungen im Science-Policy-Interface

15.00 Uhr Schlussplenum zur Klärung offener Fragen, der Abstimmung des weiteren Verfahrens und für individuelle Fazit

Annex IIIb: Workshop Flyer

Das europäische Projekt INSPIRATION (INtegrated Spatial PlannIng, land use and soil management Research AcTION) entwickelt eine **strategische Forschungsagenda** für Landnutzung und Bodenmanagement in Europa.

Boden und Fläche sind begrenzte Ressourcen. Die Art, wie wir unsere Bodenressourcen nutzen und unsere Landnutzung gestalten, ist eine zentrale Herausforderung im Streben nach einer **nachhaltigen Entwicklung** in Europa.

Allerdings wird die **Komplexität des Systems** und seiner Wechselwirkungen mit Umwelt und Gesellschaft nach wie vor nur unzureichend verstanden und kaum in praktische Empfehlungen zum Landmanagement eingearbeitet.

Stakeholder aus den Bereichen Raumplanung, Landnutzung und Bodenmanagement werden ihr Wissen einbringen, um die Zukunftsperspektiven der notwendigen Forschung mit auszugestalten.

Ziel von INSPIRATION

ist es, den Forschungsbedarf für das breite Themenfeld „**Landnutzung**" auf Grundlage der Anforderungen von **Wissenschaft, Anwendung und Forschungsförderung** zu ermitteln.

Als Ergebnis soll eine strategische Forschungsagenda für Landnutzung und Bodenmanagement entstehen,

- die in ganz Europa Anwendung finden kann,
- notwendiges neues Wissen generiert,
- den Austausch von bestehendem Wissen fördert
- und gleichzeitig die wesentlichen gesellschaftlichen Herausforderungen anspricht.

Die **16 teilnehmenden Länder** führen nationale Workshops und Experten-/innen-Interviews durch, um die jeweiligen Forschungsprioritäten mit nationalen Stakeholdern zu erheben.

www.inspiration-h2020.eu

Gesamtkoordination
INSPIRATION wird vom Umweltbundesamt koordiniert.
Kontakt: *inspiration@uba.de*

Umwelt Bundesamt

Um den Forschungsbedarf **gesellschaftlichen Herausforderungen** strukturiert gegenüber zu stellen, werden die national erhobenen Informationen durch Forscher der Dresden International University, ETH Zürich, BRGM Paris, IETU Katowice und dem UFZ Leipzig in vier Themenbereichen synthetisiert:

Annex IV: INSPIRATION at a glance – German

Hintergrund

Boden und Fläche sind begrenzte Ressourcen. Die Art, wie wir unsere Bodenressourcen nutzen und unsere Landnutzung bei teilweise gegensätzlichen Ansprüchen gestalten, ist eine zentrale Herausforderung im Streben nach einer nachhaltigen Entwicklung in Europa und der Welt. Durch Forschung und Wissensvermittlung hat sich das Verständnis von Zusammenhängen und Wechselwirkungen von Landnutzung und dem System „Boden-Sediment-(Grund-)Wasser“ in den letzten Jahrzehnten deutlich erhöht. Allerdings wird die Komplexität des Systems und seiner Wechselwirkungen mit Umwelt und Gesellschaft nach wie vor unzureichend verstanden und in praktische Empfehlungen zum Landmanagement eingearbeitet.

Ziele

Ziel von INSPIRATION ist es, den Forschungsbedarf für das breite Themenfeld „Landnutzung“ auf Grundlage der Anforderungen von Wissensanwendern und Forschungsförderern zu ermitteln. Im Ergebnis soll eine strategische Forschungsagenda für Landnutzung und Bodenmanagement entstehen, die in ganz Europa Anwendung finden kann, notwendiges neues Wissen generiert, den Austausch von bestehendem Wissen fördert und gleichzeitig die wesentlichen gesellschaftlichen Herausforderungen anspricht.

Teilziele von INSPIRATION sind die:

- Identifizierung zukünftiger Forschungsprioritäten im Kontext Landnutzung (inklusive der hiervon betroffenen Boden-, Sediment- und Grund-/Wassersysteme)
- Zusammenfassung des Sachstandes in übergeordneten Rahmenthemen
- Identifizierung von Wissenslücken zwischen aktuellem Wissensstand und Wissensbedarf zur Lösung gesellschaftlicher Herausforderungen
- Ausarbeitung, Konsultation und Abstimmung einer strategischen Forschungsagenda zur Schließung dieser Wissenslücken
- Identifizierung von praktikablen Modellen zur Förderung, Finanzierung und Umsetzung der Forschungsagenda
- Austausch und Abstimmung mit Politik, Forschungsförderungseinrichtungen, Forschungsinstitutionen und den nationalen, europäischen und globalen Nutzern von Forschungsergebnissen/-produkten.

Ablauf

INSPIRATON wird in 5 Bearbeitungsphasen durchgeführt:

1. Identifizierung des Forschungsbedarfs im Dialog mit Anwendern und Forschungsförderorganisationen: Welche gesellschaftlichen Anforderungen werden an eine nachhaltige Landnutzung gestellt? Welche Implikationen hat dies für den Boden-, Sedimente-, (Grund-)Wasserschutz?
2. Status-Quo-Analyse: National Focal Points (NFPs) führen Audit zu Forschungsaktivitäten und -kapazitäten durch
3. Zusammenstellung der thematischen Wissensbedarfe mit Blick auf noch nicht befriedigte gesellschaftliche Herausforderungen
4. Ausarbeitung einer strategischen Forschungsagenda (SRA) zur Adressierung der Wissens- und Forschungslücken
5. Umsetzungswege (Finanzierung, Partnerschaften) zur Implementierung der SRA

Nationale Kontaktpunkte

In jedem Teilnehmerland von INSPIRATION wurden Kontaktpersonen benannt (National Focal Points = NFPs), die für die Erhebung und Zusammenstellung von Informationen über die jeweils nationale Forschungslandschaft sowie Maßnahmen zum Wissenstransfer (laufende Aktivitäten, Ansprechpartner, Forschungsfördereinrichtungen) verantwortlich sind. Als Grundlage für eine kohärente Evaluation des Forschungsbedarfs wird diese Datenbasis anschließend nach Teilthemen strukturiert und analysiert.

Gegenwärtig sind 16 europäische Länder (davon 15 EU Mitgliedstaaten) an den Erhebungen in INSPIRATION beteiligt. Staaten, die nicht als Projektpartner teilnehmen, wird die Möglichkeit zur Teilnahme an den nationalen Workshops der Projektpartner gegeben. Zudem werden sie Gelegenheit haben, den Entwurf der Forschungsagenda zu kommentieren. Damit wird angestrebt, möglichst viele Belange aus allen 28 EU Mitgliedstaaten zu berücksichtigen.

Übergeordnete Rahmenthemen

Um die Forschungslandschaft und -bedarfe den gesellschaftlichen Herausforderungen strukturiert gegenüberstellen zu können, werden in INSPIRATION die national erhobenen Informationen in vier übergeordneten Themen integriert betrachtet:

1. Treiber der Nachfrage nach Boden-, Sediment- und Grundwasserressourcen
2. Verantwortlicher und fürsorglicher Umgang mit dem Naturkapital
3. Integriertes Boden- und Flächenmanagement
4. Netto Effekte: Verständnis für indirekte Werte und globale Landnutzungsauswirkungen.

In jedem Rahmenthema werden die relevanten Forschungsfragen zu Aspekten der Landnutzung und des Bodenschutzes durch eine erfahrene Expertengruppe in gegenseitiger Abstimmung gebündelt.

Arbeitspakete

INSPIRATION wird fünf Arbeitspakete beinhalten:

1. Projektmanagement und Kommunikation: AP 1 umfasst die Projektleitung und das -management sowie die Kommunikation mit externen Anfragen
2. Anforderung von Nutzern und Forschungsförderern: AP 2 startet mit der Erfassung der national, gesellschaftlichen Anforderungen. Es führt die nationalen Audits zu den Forschungsaktivitäten und -kapazitäten durch und ordnet sie übergeordneten Rahmenthemen.
3. Übergeordnete, integrative Rahmenthemen: AP3 gleicht den Stand der Forschung mit den erhobenen Bedürfnissen in vier Rahmenthemen ab, um Forschungslücken in den jeweiligen Schwerpunktthemen zu identifizieren
4. Ausarbeitung der Strategischen Forschungsagenda und Implementierungsmechanismen: AP 4 wird unter Einbeziehung aller Partner von INSPIRATION sowie besonders interessierter nationaler Akteure die zentrale Forschungsbedarf für eine koordinierte (länderübergreifende) Herangehensweise identifizieren. Im Mittelpunkte steht das zentrale Ziel einer nachhaltigen Landnutzung. Hierfür werden die zentralen Schwerpunkte und Forschungsbedarfe in den Themenfeldern priorisiert. Darüber hinaus werden im AP4 die zentralen Ansprechpartner der SRA auf Seite der Forschungsförderer adressiert und mit ihnen Möglichkeiten und Modelle für die Implementierung der SRA eruiert.
5. Externe Kooperationen - strategische Impulse und Dissemination: AP5 obliegt die Kommunikation mit externen Partnern und Netzwerken (insbesondere Politikvertretern und Forschungsfördereinrichtungen im Bereich der Landnutzung), die Beiträge zur Entwicklung und Umsetzung der SRA leisten können.

Ansprechpartner für Deutschland

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8. Italy

Report by Matteo Tabasso, Sarah Chiodi, Giulia Melis

8.1 Executive summary

8.1.1 English version

This document reports the information collected in Italy though interviews to the National Key Stakeholders (31 people representing 29 organizations) and through a desk-exercise based on documents review from indirect sources and from NKSs suggestions. The information refers to:

- research and innovation needs related to land uses and management and to the soil-sediment-water system;
- experiences regarding the connection of science to policy/practice;
- national and transnational funding schemes.

The document was discussed with all the NKSs attending the workshop held the 26th and 27th November in Turin, at the Higher Institute on Territorial Systems for Innovation (SiTI), in order to finalize the Strategic Research Agenda for Italy aimed at meeting the social challenges proposed by the European Commission, previously shared and agreed among the NKSs.

Societal challenges integrated by NKSs

- Contribute to food security and food safety
- Ensure secure supply of safe drinking water
- Secure energy supply and distribution
- Reduce raw material and resource consumption
- Ensure efficient use of natural resources
- Contribute to climate change mitigation and societal adaptation
- Contribute to a healthy and safe living environment
- Ensure secure infrastructure
- Reach zero land take balance
- Promote the recycle and reuse economy
- Ensure social inclusion

Research and innovation needs

Following the workshop and the document revision (shared with all the NKSs) four main research themes were identified, which have been further articulated into more detailed sub-themes (from 4 to 7 for each main theme):

1. sustainable management of natural resources;
2. contamination of water, soil and sediments;
3. spatial and urban planning;
4. cross-cutting themes.

Experiences regarding connecting science to policy/practice

Generally, the chain of knowledge from research producers to research users in Italy is felt to be weak and spread, and with limited social impact. The knowledge transfer skills, gained by policy makers and by the business world through research, indeed were considered very poor.

The influence of national stakeholders on research planning differs for everyone and is often related to the political interests of each specific organization/company in which the NKS works. Nevertheless, most of the speakers judged their own influencing capacity on defining the research questions quite limited. The only exception is about the NKSs who work in the major research centers that are close to the ministries linked with the INSPIRATION themes.

National and transnational funding schemes

Considering the limited number of answers from the NKSs on this subject, we tried to list funding schemes and possibilities for research funding in Italy by gathering them according to their nature (private or public) and their geographical scope (local, regional, national, transnational) (see. Annex I d).

8.1.2 Italian version

Questo documento riporta le informazioni, raccolte in Italia attraverso le interviste ai National Key Stakeholders (31 persone, 29 enti) e l'analisi della letteratura e dei documenti, correlate a:

- le esigenze di Ricerca e Innovazione riferite agli usi e alla gestione del territorio e al sistema Suolo-Acqua-Sedimenti;
- le esperienze relative alle connessione tra il mondo della ricerca scientifica, le politiche e le pratiche;
- gli schemi di finanziamento disponibili a livello nazionale.

Il documento è stato poi riesaminato con tutti i NKS presenti nel workshop del 26 e 27 novembre 2015 a Torino presso la sede dell'Istituto Superiore sui Sistemi Territoriali per l'Innovazione (SiTI), con la finalità di definire in forma condivisa il Rapporto e le priorità dell'Agenda di Ricerca Strategica su territorio e ambiente in Italia, e confrontandosi con le sfide sociali proposte dalla Commissione Europea, già integrate con le osservazioni dei NKS.

Elenco delle sfide sociali condivise dai NKS:

- Contribuire alla sicurezza alimentare
- Garantire un approvvigionamento sicuro di acqua potabile
- Assicurare il fabbisogno e la distribuzione di energia
- Ridurre il consumo di risorse e di materie prime
- Garantire l'uso efficiente delle risorse naturali
- Contribuire alla mitigazione dei cambiamenti climatici e all'adattamento sociale
- Contribuire a un ambiente di vita sano e sicuro
- Garantire infrastrutture sicure

- Saldo zero consumo di suolo
- Favorire un'economia del riciclo e del riuso
- Garantire l'inclusione sociale

Esigenze di ricerca e innovazione

In seguito al workshop e alla revisione del documento (condivisa con i NKS) sono stati identificati quattro principali temi di ricerca, a loro volta suddivisi in sotto-temi di approfondimento (da 4 a 7 per ciascun tema principale):

1. la gestione sostenibile delle risorse naturali;
2. la contaminazione delle acque, del suolo e sedimenti;
3. la pianificazione territoriale e urbanistica;
4. temi di ricerca trasversali.

Il rapporto tra la ricerca scientifica, le politiche e le pratiche

In generale, la catena della conoscenza dai produttori agli utilizzatori della ricerca è stata giudicata debole e dispersiva, e di limitato impatto sociale. La capacità di trasferimento della conoscenza acquisita attraverso le ricerche ai policy maker e al mondo dell'impresa è stata infatti considerata molto carente.

L'influenza degli stekeholder nazionali sulla programmazione della ricerca differisce per ognuno ed è spesso posta in relazione agli interessi politici della specifica struttura entro cui il soggetto lavora. La maggior parte degli interlocutori ha comunque giudicato limitata la propria capacità di influenzare direttamente i temi di ricerca, fatta eccezione per i centri di ricerca maggiori che lavorano in stretto contatto con i ministeri interessati dai temi di INSPIRATION.

Fonti nazionali e internazionali di finanziamento per la ricerca

Considerato lo scarso riscontro di risposte di NKS su questo tema, abbiamo provato ad elencare le possibilità di finanziamento per la ricerca in Italia raggruppandole a seconda della natura (privata o pubblica) e dell'ambito territoriale (locale, regionale, nazionale, internazioanle) dei fondi (cfr. Annex I d).

8.2 Methodology followed

This document (i.e. INSPIRATION deliverable 2.4) reports the information collated for Italy. The information was gathered according to the INSPIRATION document D2.3 “Template for national information collation” following these steps:

- stakeholder analysis and selection of about 20 actors;
- National Key Stakeholders interviews;
- After a first round of interviews (initially planned to be 20), the number of selected National Key Stakeholders raised to 31 (with 29 organizations represented), accomodating the suggestion of representatives to be included given by the first group of stakeholders interviewed (details on NKSs are provided in Annex I);
- desk-exercise based on documents review from indirect sources and from NKS suggestions (these are listed in Annex II);
- identification of fund-raising models and scheme for research, as taken from indirect sources and NKSs interviews;
- organization of a 2-days national workshop for reviewing and synthetizing the collected information as above.

The National Report was drawn up in two stages. The first report (Deliverable D.2.4) was drafted before the national workshop and sent to all the NKSs before the final delivery, in order to integrate their comments. At this stage almost none of the NKSs presented any remarks. The second report (this Deliverable D2.5) was written after the national workshop, during which the group worked intensively by sharing and re-defining the research topics and other related issues (the science to policy/practice interface and the funding schemes).

26 NKS (on 31 invited), representing 23 institutions, took part to the two-days workshop (for the program see Annex I e – Workshop Agenda – in italian). All the NKS participated actively and enthusiastically in the activities, by discussing passionately the research themes emerged from the interviews and the issues related to the science-policy interface and the funding options available in the country.

Once agreed the research and innovation needs and synthetized the round table discussions on the other issues, the NFP integrated the National Report and sent it to all the NKSs. We received few remarks (but we should consider that the most part of the sharing work was already done during the workshop), which were focused on the research themes and were mostly related to the English translation from Italian (because the workshop was discussed in Italian). The research needs list was modified consequently in the final deliverable.

8.3 Research and Innovation (R&I) needs

8.3.1 Societal challenges and needs

The majority of the NKS consider all the societal challenges suggested from the European Commission equally important. Someone suggested to reorganize and group them into families, such as: a group associated with quality of soil, another with food supply, another with urban regeneration and so on. The general perception is that the societal challenges indicated are wide enough to include many other minor challenges and topics. Anyway some specifications were recommended.

One is on water and soil system. The challenges from EC related to this topic are “ensure secure supplies of safe drinking water” and “ensure efficient use of natural resources”, but in the opinion of some NKS it’s missed the idea of safeguard and its relation with ecosystems, which means something more than just ensuring water supply. Furthermore, some NKS pointed out that also water maintenance and hydrogeological risk prevention should be explicitly considered.

Risk management was often named by all NKS, but they considered it already part of the EC list, namely within “ensure secure infrastructure”.

Another societal challenge regarded as important was the reduction of land take, which some NKS considered already included in the EC challenges list, but others said it should be added to the list in a separate line. Related to this challenge are the themes of urban renewal and brownfields reuse.

Some NKS argued that social inclusion and sociological aspects in general should be also included. For someone it meant to involve people in decision making processes on environment and land use, while for others it meant to improve the culture of environmental sustainability through public engagement; by organizing citizens trainings in order to increase awareness on this topic and on its societal impacts. Finally, societal adaptation to risk also emerged as a challenge.

8.3.2 Topics / research needs to include in the SRA

IT-1: Sustainable management of natural resources: so what?

Limited natural resources (such as water and soil) should be used and managed following the principle of sustainability, in order to preserve them for the next generations. Generally NKS focused on the need of preserving water and soil (by quantity and hydrogeological stability), highlighting specific research question related to agriculture.

Specific research questions:

Demand:

- **Genetic selection practices and techniques**:

  The challenge of Genetically Modified Organisms s to mitigate farming impacts and to increase crop production; GMOs are able to make plants more resistant, so reducing the use of chemicals. In Italy GMOs field trials are forbidden, but genetics is a research priority for some NKS;

  Why: According to some NKS, research on GMOs can help to answer an increasing food request with a limited soil availability, assuring same production with less chemical provision. Others strongly disagree. The lack of scientific certainties about the long-time effects on consumers makes the theme strongly debated and asks to be studied in depth.

Natural capital:

- **Water purification technologies for reuse**:

  Phytoremediation for example does not always achieve optimal results; therefore it would be important to analyse existing technologies and to implement them, even creating innovative tools.

  Why: The use of these technologies can ensure safe water for agriculture, contributing to food security and safety.

- **Recovery and treatment of rainwater**:

  The water cycle (primary water, rainwater and treated wastewater) should be integrated by implementing existing technologies and developing appropriate strategies of intervention and management. The legislation already works in this direction, but it's important to promote a sustainable water management based on the local needs and conditions. Particularly these strategies are required in some Italian geographical areas, which are characterized by limited presence of water. A diffused culture of sustainable consumption and of water reuse should be also promoted among citizens.

  Why: It is particularly important to encourage water cycle in urbanized areas in order to ensure the efficient use of water.

Land management:

- **Optimization of water use in agriculture**:

  Agriculture is the main consumer of water and the productive cycle of crops requires large water volumes. The water resource is available in limited quantities; therefore optimizing the use of water in irrigation is needed in terms of sustainability. A contribution to this research topic, even financial, could come from irrigation Consortia, which are economically strong bodies who govern water management in agriculture;

  Why: The responsible use of limited resources is becoming an urgent theme in political agendas worldwide. Increase **protection of fertile soils** and enhance protected areas, by limiting transformative pressures of natural sites (following the Natura 2000 strategy).

- **Development of conservative agricultural techniques**:

  Conservative agricultural techniques are able to guarantee greater stability of soils, thus mitigating impacts on soil biodiversity and saving soil fertility; while massive "industrial" techniques for food production don't take in account soil and biodiversity as a limited resource.

  Why: Preserve biodiversity and soil fertility is clearly recognized as an urgent theme, even by the literature.

- **Integrated operating models for soil and sediment management and reuse**:

  Ground movements caused by human or natural reason, in urban or suburban areas, river or lake areas, generate ground and sediments that could be reused in situ. It's important to create models, technologies and tools for their reuse.

  Why: Laws already claim for such procedures, but it's important to improve them in order to enact the sustainable development paradigms.

Net impact:

- **Land subsidence monitoring and management**:

  To measure the effects of subsidence, various components have to be considered: natural, tectonics, geological, anthropic etc. Risk areas should be adequately monitored by measuring precisely the vertical soil movements. The current measuring methods aren't still able to take to fully describe this complex phenomenon.

  Why: research in this area is required in order to prevent damage caused by subsidence and to propose possible remedies to this phenomenon.

IT-2: Contamination of water, soil and sediments

The presence of pollutants (identified on the basis of their sources of emission and their quantity and dangerousness) generates significant impacts on the surrounding environment, which can create health and ecological risks (for the human health and the animal and plant world), and affect the cultural heritage and the landscape. The research development on these issues is needed in order to prevent and limit the risks for human health, the nature, the heritage and the landscape. Moreover, many NKS raise critical questions (cost, time, legal system, etc.) about remediation procedures, highlighting the high priority of this topic.

Specific research questions:

Demand:

- Models and tools for the definition of **harmonized indicators for contaminated sites management.**

  The information flow about contaminated sites has to be harmonized in order to optimize the data management, starting from creating a national database of contaminated sites (actually only some regions have it). The data management of contaminated sites has to be optimized Europe-wide and from the local to national level as well.

  Why: this topic is very urgent for almost all NKS and it's especially very helpful for public administration.

Natural capital:

- **Study of emerging contaminants** (bio-accumulation and bio-dispersion), and study of mixtures and of matrices contamination:

  There is also a lack of attention in the law about the presence in environmental matrices of emerging pollutants and their consequences on the environment and people's health. Research should focus on monitoring campaigns to quantify the problem, on procedures to estimate the hazard of the emerging pollutants on the basis of the most relevant exposure pathways, as well as on methodologies to estimate the risks for humans and the environment.

  Why: there is a serious lack of knowledge about contaminants properties and distribution in the different environmental matrices and their interaction with health. This gap has to be filled as soon as possible in order to avoid risks for public health.

Land management:

- **Sustainable remediation technologies and procedures**:

  Many NKS raise questions about the remediation procedure: very high cost, waste of time related to bureaucracy and decision makers disagreements, lack of best practices for the impact assessment, weak interaction with research, lack of clarity and uncertainty of the legal system, lack of knowledge about specific soils (notably Italian lands are very diversified).

  Why: It's one of the most cited topic and it's priority is considered very high by all the NKS. It involves many stakeholders and end users who could benefit from this research.

Net impact:

- **Improvement and harmonization of risk assessment and management tools**:

  Human health and ecological risk assessment for polluted sites is required by many Italian laws, but there is still the need for the validation and integration of updated environmental fate and transport models and exposure models within the available tools which have been developed to properly apply the methodological approach scheduled by the law.

  Why: NKS have different opinion about the actual needs of research on this topic, but for some of them it is very relevant.

IT-3: Spatial and urban planning

Italy is one of the highest soil consumers in Europe and the improvement of research in spatial and urban planning can contribute to mitigate this phenomenon. The mitigation of land take, together with land safety, urban renewal and regeneration, and the reuse of contaminated areas, should be strategic objectives in our country (Ispra, 2015). Within this framework, NKS move in two directions. According to Inspiration glossary, one is closer to the key-word of soil sealing and moves together with the loss of fertile soil and biodiversity. Whereas the other dimension entails the reuse of abandoned areas and buildings, and it's linked to brownfield remediation.

Specific research questions:

Demand:

- **Land management models and instruments oriented to zero land take balance**:

  Despite the peculiar fragility of its lands, Italy is one of the highest land taker in Europe. The mitigation of land take, together with land safety, urban renewal and regeneration, as well as the reuse of contaminated areas, should represent a strategic objective in our country (Ispra, 2015).

  Why: This last is definitely the most cited topic, asking for new effective strategies (new policies, new laws, new procedures). The priority of this topic is very high.

Natural capital:

- **Soil ecosystem services protection and management**: Ecosystem goods and services are the direct and indirect contributions of ecosystems to human wellbeing. Ecosystems provide four different categories of services: provisioning services, regulating services, habitat or supporting services and cultural services. Ecosystem services indicators (to be defined and measured by the research) could be integrated into existing planning tools (notably in the Strategic Environmental Assessment - SEA) and into soil management models (to be designed by the research as well).

  Why: Soils provide a wide range of vital ecosystem services (ES). Soils ES are threaten by land take, soil sealing, erosion, land degradation, pollution. There is a need to study and assess ES provided by soils in order to prevent degradation and possibly to improve it.

- **Monitoring Information Systems and flood risk management techniques**: Water monitoring systems could be a worthwhile investment in research by accessing and organizing local data at the national level. With a global perspective (of the whole country and ideally worldwide) resources could be saved by identifying real flood risks and acting to prevent it.

  Why: Sustainable water management can ensure economical saving and actual flood risk prevention, mitigating environmental disasters.

- **Erosion and runoff models and scenarios**:

  The risk of surface water run-off represents a soil threat. The main soil degradation processes involved are: soil erosion and soil contamination by transferring Plant Protection Products (agrochemicals), soil fertility and soil biodiversity loss;

  Why: The erosion phenomena is huge especially on the hills, with relevant economic impact on valuable crops.

Land management:

- **Urban regeneration models and tools to strengthen urban resilience**:

  Promote strategies and urban policies focused on the reuse of abandoned areas and buildings (including brownfields and their remediation), looking to 'zero land take' horizon. Afterwards the massive industries' disposal, indeed, wide soils (which during the industrial age were outside the city, but currently are within) need to be remediated. The strategic position of these lands is very relevant, both in term of real estate and urban densification, and could help reducing new land take.

  Why: these processes could lead wide benefits to sustainability in general, impacting on society, environment and economics (improving the competitiveness of the city in the global arena).

- **Landscape quality indicators in spatial and urban planning**:

  The need for indicators to evaluate and monitor the effects of landscape policies and plans is a big research topic related to land management and environmental issues. Landscape is already considered in spatial and urban planning and in SEA, but unlike air, soil, or water, it is difficult to measure it using quantitative methods, because of its multiple dimensions.

  Why: Both practitioners and public authorities can profit of this research, which can offer a contribute to landscape policies, plans and landscape assessment (within SEA and EIA procedures and multi-criteria assessment methods)

Net Impact:

- **Study of the relationship between built environment and health**:

  Nowadays it is recognised that built environment has an impact on human health and wellbeing and that actions aimed at improving health are likely to be influenced by the environmental and socioeconomic context in which they take place. Therefore urban design and planning can play an important role in this context.

  Why: Several studies on this issue have been developed during the last years but research based on empirical data is still missing.

IT-4: Cross-cutting themes

Soil, water and sediments have to be consider together, both from the spatial dimension and from the competencies. It means to enforce an holistic and interdisciplinary approach rather than facing issues separately, from different sectors or disciplines. We know how to solve environmental problems technically, but the biggest issue is how to connect them: Which are the environmental economic and social costs behind decisions in planning for the environment? How to deal with communication and risk information towards stakeholders? How to improve the political-administrative system?

Specific research questions:

Demand:

- **Rationalization and efficiency improvement of the political-administrative system** (agencies):

  Water management agencies in some Italian regions are supernumerary: for example, in Sicily region there are 7.000 agencies dealing with water compared to the 22.000 active in the whole Country. The administrative system has to be reviewed.

  Why: This lack of efficiency has heavy economic consequences on the national and regional financial budget.

Natural capital:

- **A new theory of value to associate with environmental issues:**

  This research need is focused on the aim of making nature's economic values visible and mainstreamed into decision-making at all levels. A new theory of value (in economic terms) is needed in order to achieve this goal. A structured approach to valuation can help decision-makers to recognize the wide range of benefits provided by ecosystems and biodiversity.

  Why: Demonstrating and capturing nature's economic values in decision-making can contribute to sustainable development and to optimize decision making processes.

Land management:

- **Supporting tools and methods for decision making**:

  How to optimize decision making among stakeholders? This is a high matter among NKS. Working groups shared with researchers, public institutions and with all the stakeholders are coveted. Technical decision analysis, decision making supporting systems and tools can be able to provide support throughout the decision process.

  Why: Ensuring shared, transparent and reproducible decision making process is a societal commitment, also supported by the European legislation.

Net Impact:

- **Risk Information and communication**:

  Effective communication of information and opinion on risks associated with real or perceived environmental hazards is an essential and integral component of risk management. Providing meaningful, relevant and accurate information, in clear and understandable terms targeted to specific audience, can led to more widely understood and accepted risk management decisions. Research and development of ICT tools and metrics, as well as guidelines on mitigation strategies and implementation methodologies, can contribute to effective risk communication.

  Why: It's very important to give appropriate information, especially to private stakeholders involved in remediation activities, about both the actual risk situation and the environmental, health and economic benefits related to the remediation activities. Because if nothing is done on this issue, the remediation procedures, as established by the law, risk to be definitively blocked.

8.4 Experiences regarding connecting science to policy/practice

8.4.1 Use of knowledge

Answers of NKS differ according to their profiles.

The survey revealed that end users regularly use scientific knowledge from any kind of available source of (scientific) knowledge. Some stakeholders made a distinction between technical data and scientific knowledge, specifying that while technical data are easily available, scientific knowledge and new findings from research are less accessible. The issue is that in Italy there is a lack of applied research, therefore it is quite difficult to benefit from new findings if they aren't adequately connected to practices.

When end users are public authorities, the lack of applied research is specifically referred to standardized and shared procedures, in order to avoid different interpretations of the same law and in order to agree on common values. Shared models, common vocabularies, cost-benefit analysis, supporting tools are identified as potentially effective goals that the research should achieve.

Some end users working for public agencies reported that their organizations often co-fund research projects: what happens then is that a sector of the organization often commissions external experts, and in the end the results and knowledge do not necessarily produce direct benefits to the funding organization itself as results are not adequately circulated. Thus the knowledge chain is not very clear and demonstrates the strong sectorial approach within public structures.

Pure funders do not directly use scientific knowledge: they are mainly dedicated to management and administrative matters. Most of the time, they fund scientific researches and check the impact of funded researches in specific fields or spatial areas connected to the aims of their Organization.

Knowledge providers obviously consider the state of the art and previous research before starting a new research, but they are more focused on knowledge production than on knowledge use. So they are quite caustic on this issue.

8.4.2 Possibilities to set the agenda

In Italy there is no habit to set research agendas at national level, especially on specific disciplines or sectors. The three-year National Research Programme (PNR), prepared by the Ministry of Education, Universities and Research, is almost unknown to most NKS. People from science sector at least know some specific programmes included in the PNR. Anyway no NKS has ever been consulted for the PNR design. The last PNR (2014-2020) has not been definitely approved yet, but a draft is available. It doesn't refer to specific topics (like environmental issues or land management), but it's focused on different typologies of programmes, such as research infrastructures, scientific excellence and industrial leadership (in the wave of the European Horizon 2020).

Nevertheless the idea to set research or policy agendas is beginning to spread in the Country, for example with the participation of Italian research organizations and funding agencies, administrations and industries to European research agendas which have some shared research questions with Inspiration, such as:

- The Strategic Research Agenda launched by the Joint Programming Initiatives on Agriculture, Food Security and Climate Change (JPI FACCE)[21] in 2012, (updated by the "First Biennal Implementation Plan 2014-2015"). Five core themes were identified by the SRA JPI-FACCE: 1.Sustainable food security under climate change; 2.Environmentally sustainable growth and intensification of agriculture; 3. Assessing and reducing trade-offs between food production, biodiversity and ecosystem services; 4. Adaptation to climate change; 5. Mitigation of climate change.
- The Strategic Research and Innovation Agenda within the JPI Water challenges for a changing world (2014)[22]. Five Research, development and innovation themes were identified: 1. Maintaining ecosystem sustainability; 2. Developing safe water systems for the citizens; 3. Promoting competitiveness in the water industry; 4. Implementing a water-wise bio-based economy; 5. Closing the water cycle gap.
- The Strategic Research Agenda adopted by the JPI Connecting Climate Change Knowledge for Europe (2011)[23]. Four modules were designed to generate climate knowledge priorities among the participating countries: 1. Moving towards decadal climate predictions; 2. Research for climate service development; 3. Understanding sustainable transformations of societies under climate change; 4. Improving models and scenario-based tools for decision-making under climate change.
- The Strategic Research and Innovation Agenda launched by the JPI Urban Europe[24] in 2015: Global Urban Challenges, Joint European Solutions. The main issues linked to INSPIRATION are: ecosystem services, enhancing green urban spaces, minimize carbon emissions, improve renewables "green economies" etc.).

[21] https://www.faccejpi.com/
[22] http://www.waterjpi.eu
[23] http://www.jpi-climate.eu/
[24] http://jpi-urbaneurope.eu/

Furthermore, Italy is setting the national priorities of an urban agenda that aims to address the national urban policies within the European Structural & Investment Funds. A document was first issued by the Inter-ministerial Committee for Urban Policies (CIPU) in 2013, titled “Methods and contents on the priorities within the Urban Agenda”, addressing research and innovation. For example: the integrated approach to environmental, energy and climate issues; the rational and efficient management of natural resources; the sustainable mobility; the use of ICT to local services management. Then, a National Report on cities was recently launched (October 2015) by the urban@it association, with the aim to address the National Operational Programme on Metropolitan Cities (PON Metro 2014-2020), co-funded by the European Regional Development Fund (ERDF) and European Social Fund (ESF). Following the agenda model, the Report identifies some themes linked with research on land use and environmental matter, among which: land take, climate change mitigation, energy efficiency, citizens inclusion; and, above all, the need to supply the relationship between scientific research programs, practices and policies.

The influence of NKS on policy agendas, not necessarily related to scientific research, is another matter. Indeed the NKS that are within public authorities, such as institutional bodies, or that are strictly linked with them, such as governmental agencies, act under a strong political orientation. It means that if such governmental organizations are involved in setting research agendas, it’s because of the political interest of the government in that research, and they rarely suggest different research topics autonomously; anyway when it happened, the research outcomes were not necessarily taken into account.

Other NKS profiles don’t feel themselves or their institution really able to influence the politics in general, except the NKS who are part of the major research centres, which can provide important support to the government in identifying methods and strategies or which can address, somehow (there isn’t any institutionalized or standard procedure), research activities.

8.4.3 Science – policy – practice

Almost no NKS has ever been involved in the formulation of research questions before, but many of them where involved in research projects and proposals and the feedbacks where generally positive. The only issues that were complained within the research experiences, mostly funded by European funds (rather within the European Structural & Investment Funds, above all the Interreg projects, than within the Research and Innovation funds), concern administrative and financial aspects: too much bureaucracy, which produces a big waste of time cut to the project; a procedural simplification was asked from everybody, both in the proposal templates and in administrative management of the project.

Nevertheless the research experiences were positively considered, and research outcomes quite rarely were effectively transferred into policy making or business opportunities. Indeed many people complained the lack of impacts of research into practices or policies, which generally means a lack of applied research and a weak link between scientific research and practices or polices. It doesn't mean that the issue is a general incapacity of knowledge transfer (a matter that however was often cited), but also a political conflict that sometimes emerges from the research outcome (e.g. if research results imply unpopular choices, it is likely that they will be rejected or ignored by decision-makers).

Science and policy

The science-policy interface in Italy appears more like a policy-science interface, which means a quite hierarchical process from the institutions to the scientific world. Sometimes the research world is accused to be auto-referential and not so able to communicate with the outside world, with the risk to waste research efforts for unused results. Other times the focus is more a political matter (as mentioned above).

According to most of the NKS, policies and research belong to separate worlds which hardly communicate.

The detected problems are the followings:

1. The cultural gap between decision makers and researchers: priorities and technical background are sometimes so different that the research products cannot be transposed at political level;
2. The research does not help policy solutions: policy makers would be more interested in research outcomes if they could offer not only data and theories, but also comparable alternative solutions, taking into account complexity and impacts (included the social ones) in a "If…than" framework
3. Insufficient "problem driven" approach of the research: this is sometimes due to the funding system, as researchers get funds answering to calls that are not always focused on urgent societal needs. Furthermore, researchers complain for the heaviness of bureaucracy in project management, subtracting time to real research;
4. Research and policy have a delicate balance: policy should commission and orient research to societal needs. However research should be independent, free to explore and innovate.

Some NKS reported the lack of strong and transparent assessment system to evaluate the research bodies. Research in Italy is evaluated for quality performances according to peer review processes and bibliometric parameters. University and public research centres which benefit from public funds are evaluated periodically (the previous evaluation was from 2004-2010, the current is from 2011-2014) by the National Agency for the Evaluation of Universities and Research Institutes (ANVUR) within the Quality Research Assessment (the Italian acronym is VQR). Universities are evaluated considering the research products of researchers and professors employed in the institution but considered as assembled (associated to any internal infrastructure/department) and not individually. Therefore, only the scientific aspects are assessed and not the societal impact of scientific research.

In Italy the societal impact of research is not really assessed, at least not by scientific methodology neither systematically. Nonetheless the ANVUR, within the Research Quality Assessment, evaluates the public engagement of departments and universities, without considering the impacts of single researches but how much time professors are involved in public engagement activities and which kind of public engagement activities are promoted (until five activities for each university, until two for each department).

Only research centres and institutions (including universities) use to make a Social Responsibility and Balance Sheet or Social Audit, but it refers generally to the research infrastructures and not to single researches or research groups.

For improving research quality and an efficient use of public funds, a shift towards societal challenges as research focus is needed.

Science and practice

NKS underlined an enormous lack in quality of dissemination. Research often can't reach final users, like citizens, instrumental bodies, technicians... The need for open data and a wider circulation of information was underlined.

Even when research is funded by EU, results are not easily accessible after the end of the projects. NKS highlighted the paradox of a lack in capitalizing results of EU projects: a database collecting and making it simple to filter all the projects along the time is missing.

Lack of availability of research results can create diseconomies, missed opportunities and misspends, with groups studying the same subject unaware ones of the others.

Furthermore, some NKS reported the urgent need for connection between bodies expressing request for research and the bodies which can answer. Very often the civil society faces problems without having the chance to communicate the research need. Some pilot experiences to link users-researchers-disseminators are on-taking place in Italy and clearly indicate the benefit of a shared approach.

8.5 National and transnational funding schemes

8.5.1 Funding schemes and possibilities for research funding

In Italy there is generally a short supply of research founding: the total spending percentage of R&D on the national GDP is only 1,26% (in 2012), much less than others major countries, such as France (2,23%), Germany (2,88%), UK (1,63%), United States (2,70%), Japan (3,34%), China (1,98%) and Israel (4,25%)[25]. Despite of a little growth of the R&D spending from 2009, the ISTAT[26] announced for the next years an expected decrease of R&D expenditure of public institutions, but an increase of 1.4% of private companies. Therefore, little national funding for research are available in Italy, but other opportunities came from European funds. The main funding categories are distinguished in the following paragraphs. The previous three categories refer to public or private funds, at the national or at the local (regional) level. Instead, the forth category refers to transnational funds, which can be managed by Italy, such as the European Territorial Cooperation and the European Structural & Investment Funds (ESIF), or which can be managed directly from Europe, such as the Life programme.

IT-F1: National public funds

The main Italian funding schemes for research are provided within the three-year National Research Programme (PNR) - already cited in paragraph 3.2 - prepared annually by the Ministry of Education, Universities and Research. The last PNR provides two main funding schemes for research (excluding research infrastructures), but it isn't definetly approved yet: the "Scientific Excellence" and the "Industrial leadership". Within the first group are provided 9 enables, as many specific programmes and amount of funding, like the "Scientific Independence of Fisrt Stage Reserches" (SIR), which follows the European Research Council (ERC) starting grants scheme.

Beside the National Research Programme, other national public funds for research are provided directly by the same Ministry of Education, Universities and Research (MIUR) and others Ministries (like Ministry of Economic Development, Ministry of Agriculture, Food and Forestry, Ministry of Environment, Land and Sea, Ministry of Infrastructure and Transports) to national research centers in order to finance the structural functioning of the institution (if the Ministry is the MIUR) or to finance specific research projects (for the others). The public research centers involved in the Inspiration's topics are the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) and the National Research Council (CNR) with its institutes.

Other funds schemes public to public are provided nationally by public authorities (within the Inspiration's themes e.g. are Port Authorities, but could be even Regions or others) to national public research centers (like ENEA or CNR above mentioned) or to public universities or, if specific competences are needed, to private research centers.

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[25] All data are from Airi Associations http://www.airi.it/pubblicazioni/rs-dati-statistiche-della-ricerca/ (last accessed 23/10/2015)

[26] Italian National Institute of Statistics. Information are available at http://www.istat.it/en/archive/141007 (last accessed 23/10/2015)

IT-F2: Regional or local public funds

Funds for research are also invested from the Regions or other local public authorities (such as Cities or Metropolitan Cities etc.) in order to finance the structural functioning of regional research institution (in that case are the Regions that fund their own research agencies, such as IRES or IPLA in Piedmont, or EUPOLIS in Lombardy etc.) or in order to assign specific research projects (usually is applied research) in their "personal" interest to universities or others research centers (even private if needed).

IT-F3: National and local private funds

Research funds in Italy are provided also by banking foundations, which are mostly located in northern Italy, or research foundations, which are often participated by public authorities. They operate locally, investing their funds in the areas identified in their Charter. They can provide funds to groups (partnerships with associations, companies, NGO ecc.) or to single researchers, covering the whole research cost or just a percentage, depending on the specific call and its objectives.

Professionals categories, such as federations or corporations of specific sectors (like industry, agriculture, commerce, architecture or engineering) could provide research funds as well. They usually don't have a specific research program within the organization, but they could co-fund other research projects externally or they could publish specific calls that involve the professional categories in an applied research project or in other projects that can include research activities. But the research funds they provide are just a little part of their financial capital, because research, when is taken into account, is a secondary aim for them.

Some companies also invest some funds in research and development and mainly in the North of Italy (75,7% in 2012, compared to 15,6% in the Centre and 8,6% in the South). The spending percentage of R&D invested by companies on the national GDP in Italy in 2012 was of 0,69%, compared to France 1,44%, Germany 1,91%, UK 1,05%, Spain 0,66%; facing the European average of 1,20%[27]. Research can be developed intra or extra moenia.

[27] All data are from Airi Associations http://www.airi.it/pubblicazioni/rs-dati-statistiche-della-ricerca/ (last accessed 23/10/2015)

IT-F4: European funds

The most part of the NKS experienced researches funded by the European Regional Development Fund within the European Territorial Cooperation (ETC) policy, better known as Interreg. The specific Interreg programs where Italy is included and where some topic of Inspiration are considered within the program objectives or axes are (see Annex Ic):

- Cross-border (Interreg A): Italy-France "Marittimo"; Italy-France "Alcotra"; Italy–Austria; Italy-Swiss; Italy-Slovenia, Italia-Croatia, Greece-Italy, Italy-Malta; plus one Interreg IPA (Instrument for pre-accession), Italia-Albania-Montenegro, and two Interreg ENI (European Neighborhood Instrument, Italy-Tunisia and Mediterranean Sea Basin.
- Transnational (Interreg B): Interreg Mediterranean (MED), which was one of the most cited by the NKS; Central Europe; Alpine Space; Adriatic-Ionian.
- Interregional (Interreg C): the four programs that include all the 28 UE States, which are Interreg Europe (definitely not related to Inspiration themes), Interact, Urbact III and Espon, which are weakly connected with Inspiration themes.

Other funding opportunities for research were cited within the European Territorial Cooperation and the European Structural & Investment Funds (ESIF). These were the calls opened by specific Operational Programmes available nationally or locally (regional), which benefit of the European Regional Development Fund (ERDF) and/or the European Social Fund (ESF). Considering the Inspiration's themes, the European Agricultural Fund for Rural Development (EAFRD) should be considered as well, and particularly the calls opened within the national and/or regional rural development programmes (RDP).

R&I funding options collated for country:			ITALY	
	Name*	**Research and Innovation funder****	**What and/or whom do they fund?*****	**More info********
Regional				
1	Ordinary operations or direct assignments or conventions (mostly public to public) or public competition. The procedure depends on the research budget and must respect public procurement rules (european and national)	Regions or other local public authorities (such as Cities or Metropolitan Cities etc.)	They finance the structural functioning of regional research institution (such as IRES or IPLA in Piedmont, or EUPOLIS in Lombardy etc.) or specific research projects assigned to universities or others research centers (even private if needed) in the funder's (public) interest.	
2	Direct assignments or conventions (mostly public to public) or public competition. The procedure depends on the research budget and must respect public procurement rules (european and national).	Port Authorities, Regions or others public entities	The beneficiaries could be national public research centers (like ENEA or CNR above mentioned) or public universities (or even private research centers, if specific competences are needed) in order to develop specific projects in the funder's (public) interest.	
3	Specific calls, direct assignments or conventions.	Banking foundations or research foundations (often participated by public authorities).	They operate locally, investing their funds in the areas identified in their Charter. They can provide funds to groups (partnerships with associations, companies, NGO ecc.) or to single researchers, covering the whole research cost or just a percentage, depending on the specific call and its objectives.	
etc.	Direct assignments or specific calls	Professionals categories, such as federations or corporations related to specific sectors (such as industry, agricolture etc.)	At least they co-fund specific research projects of appliers within external calls or they can provide specific co-unding schemes related to specific activities or business (non research).	

National				
1	National Research Programme (PNR)	The State: Ministry of Education, Universities and Research. Some specific programmes provide only cofunding	There are specific programmes within the PNR for different beneficiaries and focus (PhD, Indipendent researchers, infrastructures etc.)	http://www.istruzione.it/allegati/2014/PNR_online_21feb14.pdf
2	Direct assignments or conventions (public to public) or others type of agreement	Ministry of Education, Universities and Research (MIUR) and others Ministries (like Ministry of Economic Development, Ministry of Agriculture, Food and Forestry, Ministry of Environment, Land and Sea, Ministry of Infrastructure and Transports)	They fund national research centers (such as the Italian National Agency for New Technologies, Energy and Sustainable Economic Development - ENEA or the National Research Council - CNR) for the structural functioning of the institution or for specific research projects .	www.compagniadisanpaolo.it/ www.fondazionecrt.it/ www.fondazionecariplo.it/ www.fondazioneconilsud.it/
3		Professionals categories, such as federations or corporations related to specific sectors (such as industry, agricolture etc.)	At least they co-fund specific research projects of appliers within external calls or they can provide specific co-unding schemes related to specific activities or business (non research).	
European				
1	Interreg: Cross-border, Transnational or INterregional (specific calls within each Interreg programme)	EC: European Regional Development Fund	There are three types of beneficiaries: Public authorities (local, regional and national); Managing authorities/intermediate bodies, Agencies, research institutes; thematic and non-profit organisations. Organisations that work with Interreg Europe must also be based in one the 28 EU Member States. Any actions developed within Interreg must fall into one of the following four categories: Research and innovation; SME competitiveness; Low-carbon economy; Environment and resource efficiency	
2	Calls opened by specific Operational Programmes available nationally or locally (regional - POR), Considering the Inspiration's themes, the European Agricultural Fund for Rural Development (EAFRD) should be considered as well, and particularly the calls opened within the national and/or regional rural development programmes (RDP).	EC: European Regional Development Fund (ERDF) and/or the European Social Fund (ESF). Indirect funding.	The funds are provided by the EC not to individual beneficiaries, but to national and regional institutions of the Member States, which are responsible for their managing. The national and regional institutions act as intermediaries by redistributing the funds to specific beneficiaries selected by each calls opened during the programming period.	
3	Calls opened within the national and/or regional rural development programmes (RDP).	EC: European Agricultural Fund for Rural Development (EAFRD). Indirect funding.	Thefunds are provided by the EC to regional institutions of the Member States, which are responsible for their managing. The regional institutions, with the contribute of the regional research centers, act as intermediaries by redistributing the funds to specific beneficiaries selected within the axes, measures and actions estabilished by the RDP.	

*	Include full name and (if available) acronym of the R&I funding option		
**	Include name of the R&I funder/funding institute or authority		
***	Detail which type of programme, projects, partners or infrastructures they are funding		
****	Include weblink and/or other reference for more information on this R&I funding option		

8.5.2 Gaps in financial resources for research

The main gap in financial resources for research in Italy has been mostly identified with the lack of efficacy of research project, which means that the research outcomes often ignore their application in the real world and disregard the market needs. Therefore the transferability of research results should be ensured, relapsing the market and the milieu.

Another gap was the lack of control on final research results. Dissemination and communication of research project were also considered quite deficient by someone.

Moreover NKS revealed a dichotomy about private funds for research. Some of them were definitely in favour of private fund for research and advocated the participation of enterprises and foundation in research fund schemes. But others were very sceptic and considered the participation of privates in research a strong risk for the public interest.

Starting from these gaps, we develop a SWOT analysis during the National Workshop, in order to make critical considerations and to suggest some strategies for implementing the current available funding schemes.

Strengths were quite few comparing to weaknesses, but opportunities compensate threats. Many issues had strong relation with the chain of science – policy – practice – society, highlighting that financial resource optimization works along with a stronger connection among scientific research, policies/practices and society. Calling back the main gaps initially highlighted by NKS, the matter of projects dissemination and communication seems disappeared, but appeared the issue of environmental risk information and communication.

Strengths: • Spread of several research centres (but at the same time the lack of “strong” research infrastructures) • Presence of many experienced researchers in Italy (infrastructural and human capital) • Effective laws for tax exemption and patronage for research investments	Weaknesses: • Scarcity of ordinary resources available for research (especially for basic research); • Segmentation of skills and the lack of integrated funds; • Weakness, or even the absence, of planning of environmental and land policies (and practices); • Weakness of the science-policy interface; • Low skills on funding schemes and on intercepting financial resources (e.g. Consider that the success rate of the Italian answer to European funding calls in 2015 is less than 9%); • Lack of transparency of selection procedures within national research calls; • Decision uncertainty of policy-makers and poor judgment about land management sustainability.
Opportunities: • The strategic role that the private social (community foundations) can play in research, offering funds and posing research question; • Implementation (and importation) of co-funding and co-design research experiences spread word-wide; • Implementation of bottom-up processes oriented to define research agendas; • Promotion of a long horizon in research planning; • Intercepting of the “grey zone” of research demand; • Optimization of the incentives system about energy; • Consultation among actors and the creation of a virtuous supply chains; • Introduction of mixed brokerage subjects (funders, knowledge producers and end users) • Spread of tax credits.	Threats: • Fragmentation of researches and the of overlapping among research topics; • Risk of investment dissipation related to managing waste and lack of efficacy of research project (as already asserted by the NKs during the interviews); • New role of Universities as "professional advisers": to be understood as new practice developed in order to compensate the lack of financial resources into the Italian university; • Conflicts of interest between the research word and the large-scale industry, following the cited gap of NKS divergent opinions about private funding for research. • Diffused weak of knowledge of client in the private market, often not aware of the benefits offered by research.

8.6 Annexes

Annex Ia: NKS interviews in Italy

Date of interview	Organisation	Interview	funder	end user	knowledge provider	Nat.reg. loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	ediment	water	Land-use management
16/07/15 21/07/15	Region Piemonte	Annalisa SAVIO Guido BASCHENIS	1			1							1		1	1
23/07/15	City of Turin	Liliana MAZZA		1		1										1
08/10/15	ISPRA	Antonella VECCHIO, Michele MUNAFO'			1		1						1	1	1	
16/10/15	ANCE PIEMONTE	Gianluca POGGI		1							1					1
18/06/15	AUDIS	Marina DRAGOTTO		1							1					1
29/07/15	Confagricoltura Piemonte	Giovanni DEMICHELIS		1							1		1			
06/10/15	Consorzio di Bonifica del Cixerri	Andrea PEDDIS		1		1							1		1	
07/09/15	IPLA	Matteo GIOVANNOZZI		1			1						1			
16/09/15	ADBPO	Francesco PUMA		1		1									1	
06/08/15	ISMAR-CNR	Andrea BARBANTI			1		1							1	1	
19/0671 5	Studio PLANETA	Mattia BIASIOLI		1				1					1	1	1	
18/09/15	Zone Onlus (Eddyburg)	Mauro BAIONI		1						1						1
05/08/15	Università Ca' Foscari	Lisa PIZZOL			1		1						1	1	1	
05/08/15	Autorità Portuale di	Marta CITRON		1		1							1	1	1	1

	Venezia															
09/09/15	ARPA Puglia	Domenico GRAMEGNA		1		1							1	1	1	
16/10/15	INU	Silvia VIVIANI (Silvia SOPPA)		1								1				1
07/08/15	Seacoop	Mauro PERINO Giorgio QUAGLIO		1				1					1			1
12/08/15	RICS	Marzia MORENA		1							1					1
16/10/15	Regione Emilia Romagna	Nicola DALL'OLIO	1			1							1	1	1	1
30/07/15	Fondazione CRC	Andrea ALFIERI	1									1	1			1
02/07/15	Golder	Jean Pierre DAVIT		1									1	1		1
09/10/15	Nomisma	Marco MARCATILI			1						1					1
14/07/15 04/08/15	ENEA	Paola CLERICI Gaetamo BORRELLI			1	1							1	1	1	1
23/09/15	RECONnet	Renato BACIOCCHI, Igor VILLANI		1							1		1	1	1	
08/10/15	INVIMIT	Carlo PETAGNA	1			1										1
08/08/15	Regione Campania	Antonio RISI	1			1							1	1	1	1
20/10/15	Ministero Ambiente	Laura D'APRILE (Diego ANGOTTI)	1			1							1	1	1	
26/10/15	Terra srl	Marco STEVANIN		1				1					1	1	1	
26/10/15	Università del gusto di Pollenzo	Silvestro GRECO			1		1						1			
			6	17	6	11	5	3	1	1	6	2	19	13	15	16

NOTE: Names in brackets refers to people participating in the National Workshop as substitute of the interviewed person above.

Annex Ib: NKS questionnaire template

Il questionario (vedi pagine seguenti) segue il seguente schema:

A. Informazioni sull'intervista:
   Da compilare da parte dell'intervistatore

B. Introduzione:
   Che l'intervistatore può utilizzare per iniziare l'intervista NKS

C. Contesto della NKS intervistato:
   Per lo piu 'caselle da sbarrare'

D. Agenda di ricerca strategica (SRA):
   NKS preferito argomenti, documento generale i temi e le possibilità di SRA e state-of-the-art nazionale sui programmi di ricerca di cui il NKS è a conoscenza

E. Science-Policy-Interface:
   Esperienze del NKS per quanto riguarda lo sfruttamento delle conoscenze scientifiche a: migliorare le opportunità di business; affrontare altre sfide sociali; sostenere la politica attuazione e / o di revisione della politica

F. Finanziamenti:
   Prevalentemente utilizzato così come promettente schemi di finanziamento / meccanismi / programmi alternativi per la produzione di conoscenza e di diffusione di cui il NKS è a conoscenza

G. Altro:
   Alla fine lasciare un po' di tempo ai NKS per fornire consigli, eventuali citazioni (che possiamo utilizzare in forma anonima nelle nostre comunicazioni), esempi, ecc.

H. Termine dell'intervista: follow-up se e come i NKS saranno coinvolti nelle fasi successive di INSPIRATION

Questionnaire template in Italian

A. Informazioni generali sull'interlocutore
1. Nome e titolo/i: 2. Ente di appartenenza (eventuale): 3. Ruolo all'interno dell'ente o tipologia di attività professionale svolta: 4. Tipologia di ente/soggetto (sono possibili risposte multiple): ○ autorità nazionale-regionale-locale ○ università/istituto di ricerca ○ SME (piccola media impresa)/consulente ○ settore direttivo/produttivo (business/industria) ○ NGO ○ rappresentante/leader di un network ○ altro, specificare: …….. 5. Settore di competenza (sono possibili risposte multiple): ○ suolo ○ acqua ○ sedimenti ○ pianificazione urbanistica (urban planning) ○ progettazione del paesaggio (landscape designer) ○ gestione del territorio ○ altro: …..
6. La sua organizzazione fornisce finanziamenti per la ricerca? ○ Sì, specificare *(come titolare di programmi-progetti, come gestore di risorse o fondi pubblici/privati ecc.)* ○ No
D. SRA – *Temi per l'Agenda*
7. La Commissione Europea cita alcune sfide sociali da affrontare in relazione ai temi di ricerca dell'Agenda (riferiti agli usi e alla gestione del territorio e al sistema Suolo-Acqua-Sedimenti), qui elencate: - *Contribuire alla sicurezza alimentare;* - *Garantire un approvvigionamento sicuro di acqua potabile;* - *Assicurare il fabbisogno e la distribuzione di energia;*

- *Ridurre il consumo di risorse e di materie prime;*
- *Garantire l'uso efficiente delle risorse naturali;*
- *Contribuire alla mitigazione dei cambiamenti climatici e all'adattamento sociale;*
- *Contribuire a un ambiente di vita sano;*
- *Garantire infrastrutture sicure*

- Quali eventuali ulteriori "sfide sociali" suggerirebbe in relazione ai temi di interesse per la sua attività?

8. Secondo la sua opinione/la sua esperienza professionale, quali temi/argomenti di ricerca (riferiti agli usi e alla gestione del territorio e al sistema Suolo-Acqua-Sedimenti) dovrebbero essere inclusi nell'Agenda?

   Per ciascun tema citato le chiediamo di fare riferimento alle seguenti specificazioni:

   - *Chi sono i soggetti/enti interessati al tema (intesi come potenziali utilizzatori finali dei prodotti di ricerca conseguenti al tema proposto)?*
   - *Chi sono i soggetti responsabili (intesi come i potenziali promotori delle ricerche sul tema proposto, ma non necessariamente come gli esecutori delle ricerche)?*
   - *L'argomento proposto riguarda la sua attività professionale/il suo ente di appartenenza (anche diversi rami di competenza rispetto al proprio)?*
   - *E' un tema di livello nazionale, oppure è condiviso da più paesi (a quale livello)?*
   - *A che punto si trova la ricerca su questo tema, dove potrebbe arrivare nei prossimi anni (orizzonte-obiettivo)?*
   - *Come può la nuova conoscenza acquisita dalla ricerca proposta essere utilizzata efficacemente dagli utenti finali?*
   - *Qual è il grado di priorità del tema proposto (da elevato a basso)?*
   - *Qual è il grado di urgenza del tema? Ovvero cosa accadrebbe se non venisse fatto nulla in merito?*
   - *Chi potrebbe/dovrebbe finanziare questo tipo di ricerca?*
   - *Esistono documenti rilevanti (documenti istituzionali, strategie nazionali, agende-programmi di ricerca) a sostegno del tema proposto? Quali?*

E. Interfaccia tra politiche e mondo della ricerca scientifica (Science Policy Interface)
9. Nello svolgimento della sua attività professionale utilizza risultati della ricerca scientifica? Quali sono le più recenti contaminazioni derivate dal mondo scientifico nel suo lavoro? 10. La sua attività professionale/l'ente per il quale lavora, è in grado di condizionare direttamente o indirettamente i programmi di ricerca scientifica in Italia? In che modo (attraverso Tavoli di lavoro, consultazioni ecc.) e su quali argomenti? 11. Ritiene che le politiche italiane in materia di ambiente e territorio riflettano i bisogni e le priorità derivate dalla sua attività professionale? 12. La ricerca scientifica in materia di ambiente e territorio influenza le politiche di interesse per la sua professione? In che modo e su quali argomenti?
[Domande 13-14-15-16 riservate ai soggetti intervistati che NON svolgono attività di ricerca scientifica] 13. E' mai stato coinvolto nella formulazione di domande di ricerca scientifica? 14. Nello svolgimento di una ricerca scientifica? 15. Nella costruzione di un progetto di ricerca scientifica? 16. *In caso di risposta affermativa ad una delle domande precedenti*: che cosa è andato bene o cosa si sarebbe dovuto evitare nell'ambito della ricerca (costruzione della domanda di ricerca/progetto) a cui ha partecipato? Cosa potrebbe essere migliorato?
F. Risorse finanziarie
17. In che modo ritiene che gli investimenti nella ricerca in materia di territorio e ambiente possano meglio contribuire alla collettività? Ad esempio, rispetto ai temi di ricerca che ha proposto, in che modo la spesa di investimento fatta per quella ricerca potrebbe portare un effetto moltiplicatore diretto o indiretto anche su altri settori/ambiti? 18. Saprebbe suggerire delle strategie o degli schemi di finanziamento (forme e fonti di finanziamento) particolarmente virtuosi per la ricerca dei quali ha avuto esperienza diretta o di cui è a conoscenza? 19. *Se ha svolto attività di ricerca scientifica in materia territorio ambiente*, quali sistemi/fondi di finanziamento sono stati utilizzati? Di quale livello (nazionale-regionale-europeo)? 20. Conosce forme di finanziamento integrate (ad es. pubblico-privato) in materia di ambiente e territorio per la ricerca? Sono efficaci? Come ritiene possano essere migliorate?

G. Altro (osservazioni, suggerimenti, esempi):

H. Informazioni su ISPIRATION
• Vuole essere aggiornato/a sugli sviluppi della ricerca INSPIRATION? Nel caso indichi dove e come preferisce essere contattato/a: • Può suggerirci qualcun’altro che possa essere interessato a INSPIRATION, che potremmo contattare o a cui rivolgere il questionario?

INSPIRATION acknowledges the received funding from the European Community's HORIZON2020 Framework Programme under grant agreement no 642372

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

INSPIRATION - L'intervista in sintesi

Scopo di INSPIRATION:

Il principale obiettivo del progetto europeo INSPIRATION, è quello di formulare un'agenda di ricerca strategica (SRA), orientata all'utente finale, sui temi di ricerca riferiti agli usi e alla gestione del territorio e del sistema Suolo-Acqua-Sedimenti al fine di soddisfare le sfide e le esigenze attuali e future della società. Il progetto mira altresì a far emergere modelli di attuazione della SRA e di preparare una rete di istituzioni pubbliche e private che vogliono contribuire in modo congiunto all'implementazione e al finanziamento dell'Agenda di Ricerca Strategica.

National Key Stakeholders (NKS):

Attraverso una serie di interviste agli Stakeholder nazionali dei vari paesi europei, i *National Focal Point* (NFP) raccolgono a livello nazionale le informazioni relative all'obiettivo di INSPIRATION riguardo:

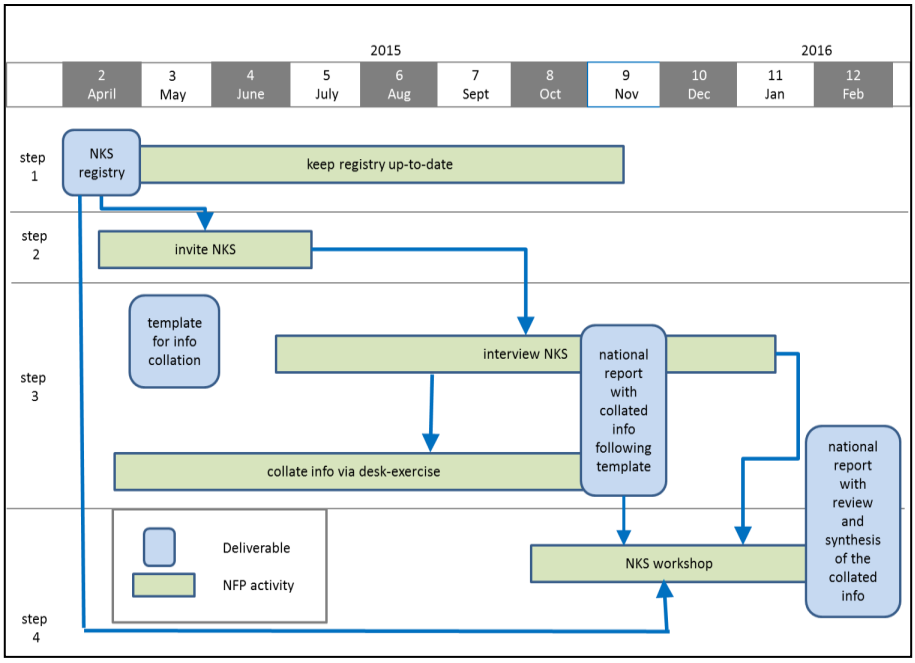
- Esigenze di Ricerca e Innovazione (Research and Innovation needs)
- Esperienze relative alle connessione tra il mondo della ricerca scientifica e le politiche/pratiche
- Schemi di finanziamento nazionali e transnazionali

Le interviste sono rivolte principalmente agli stakeholder nazionali che, come lei, si collocano in posizioni di rilievo per la loro posizione professionale, hanno una buona panoramica sulle opportunità, una visione chiara e la comprensione delle esigenze di conoscenza (a breve, medio e lungo termine). Inoltre, i NKS dovrebbero occupare posizioni di rilievo nel loro settore di pertinenza e far parte di reti professionali . Inoltre possono rappresentare potenziali ambasciatori per INSPIRATION. Abbiamo scelto gli Stakeholder in modo da rappresentare diverse discipline e contesti istituzionali, tra cui: pianificatori territoriali; manager; esperti sul tema suolo-acqua-sedimenti; ricercatori, finanziatori e soggetti pubblici.

L'intervista:

E' mirata a raccogliere indicazioni da parte sua in qualità di esperto nel suo settore, ed è di fondamentale importanza per il progetto, al fine di aiutarci a descrivere lo stato dell'arte nel nostro paese per fornire degli elementi da inserire nell'Agenda di ricerca europea. Nell'intervista verranno affrontati una serie di temi e domande. Le interviste di NKS (circa 20 per nazione) e un'analisi sulle esigenze di ricerca e sulle possibilità di finanziamento e saranno sintetizzati in un 'rapporto nazionale'. Questa sintesi sarà riesaminata in un workshop nazionale, al fine di definire le priorità sui temi che verranno proposti come punto di vista del nostro Paese. Le relazioni nazionali saranno quindi utilizzate come input per l'elaborazione della SRA europea e per incrociare i temi di ricerca con i possibili canali di finanziamento.

Diagramma di flusso del primo anno di lavoro di INSPIRATION



Esempi di domande::

Esigenze di Ricerca e Innovazione (R & I)

• Quali sfide per la società consideri come importante?

• A partire dalla sua esperienza: quali argomenti specifici (bisogni di ricerca) dovrebbero essere inclusi nella SRA?

Esperienze sul collegamento tra ricerca e politiche / prassi

• Come definirebbe 'conoscenza scientifica'?

• in che misura è stato fatto uso di state-of-art nella ricerca scientifica per la formulazione delle politiche esistenti nel nostro paese?

Meccanismi di finanziamento nazionali e transnazionali

• La vostra organizzazione prevede finanziamenti per la ricerca esterna?

• Quali esperienze e aspettative relative a sistemi di finanziamento (pubblico / privato) nel vostro campo potrebbero offrire opportunità per la ricerca futura sull'uso del territorio e sugli impatti e relativi al sistema suolo-acqua-sedimenti?

I possibili benefici:

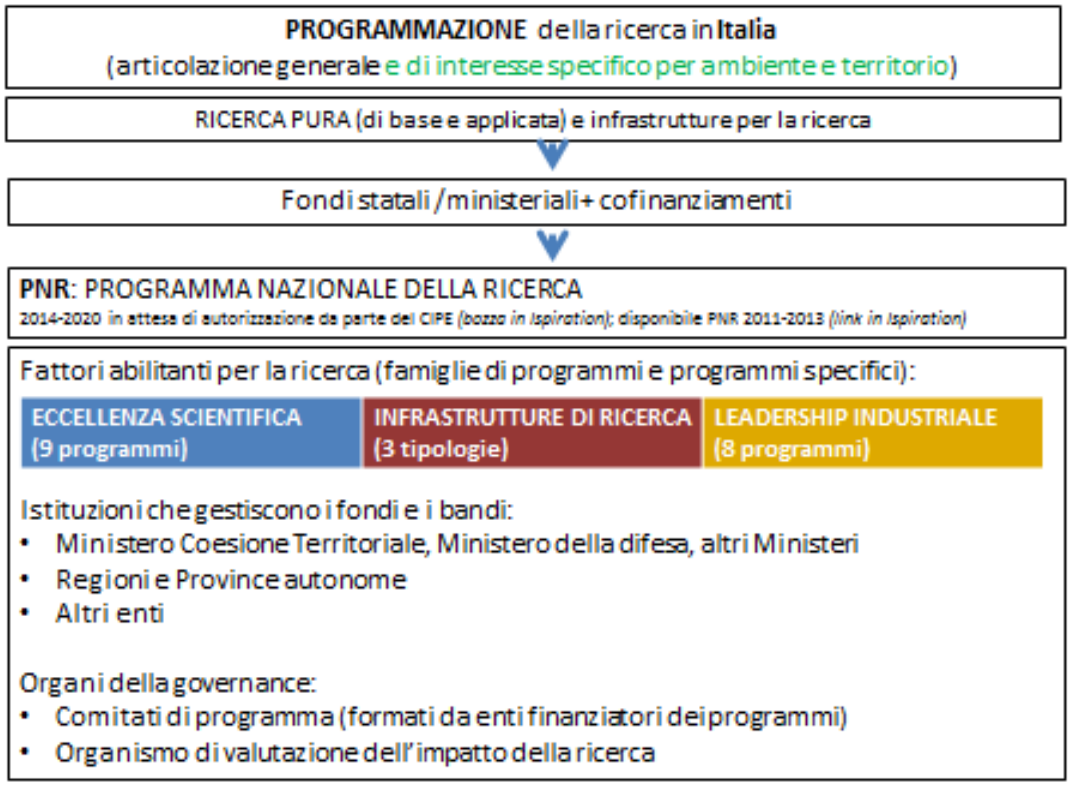
- Possibilità di influenzare la SRA europea sulla terra e la gestione SSW alla luce delle sfide e delle esigenze della società;
- Essere in grado di utilizzare i risultati del progetto: panoramica della ricerca hanno bisogno e di schemi di finanziamento promettenti su diversi livelli (sub-nazionale, nazionale, europeo, internazionale) e le opportunità per una migliore connessione tra scienza e politica / prassi esistenti ;
- Utilizzare l'opportunità di entrare in contatto con altre reti dentro e fuori del nostro paese, e capire quali sfide possono essere prese in modo congiunto dai diversi stati.

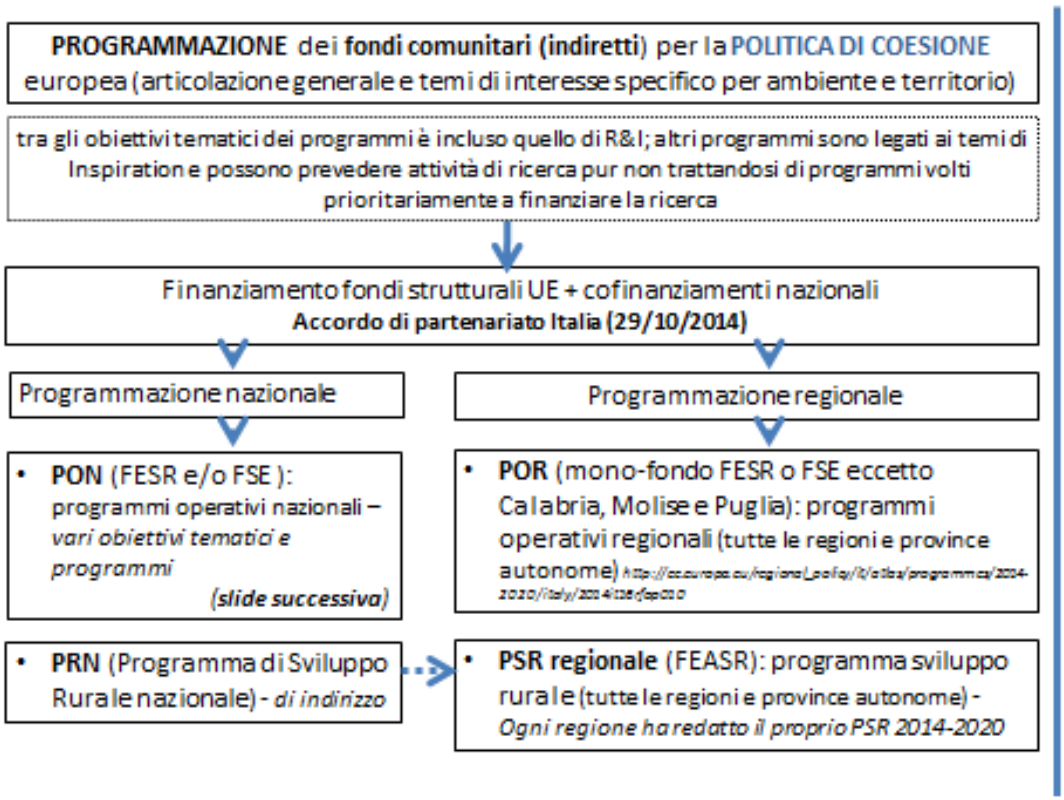
Contatti e ulteriori informazioni:

Per iformazioni generali sul progetto INSPIRATION potete visitare il nostro sito ufficiale: www.inspiration-h2020.eu

Contact the National Focal Point:	Contact the general project coordination:
Matteo Tabasso SiTI – Higher Institute on Territorial Systems for Innovation Via Pier Carlo Boggio 61 10138 Torino Phone +39 011.19751548 matteo.tabasso@siti.polito.it	Stephan Bartke FG I3.5 – Coordination INSPIRATION Federal Environment Agency Woerlitzer Platz 1 06844 Dessau-Rosslau Germany stephan.bartke@uba.de

Annex Id: Major research funds available in Italy (related to Inspiration research themes) - Document in the national language





- **PON RICERCA E INNOVAZIONE** 2014-2010 (regioni in transizione e meno sviluppate)
  MIUR: Direzione Generale per il Coordinamento, la Promozione
- **PON INFRASTRUTTURE E RETI** 2014-2010 (regioni meno sviluppate)
  Ministero delle infrastrutture: Direzione Generale per lo Sviluppo del territorio
- **PON CITTA' METROPOLITANE** 2014-2010 (nazionale)
  Ministero dello sviluppo economico: Dipartimento per lo Sviluppo la Coesione Economica

Asse II Sostenibilità urbana
Risparmio energetico negli edifici pubblici;
Illuminazione pubblica sostenibile;
Nodi di interscambio modale;
Servizi di mobilità condivisa e flotte eco-compatibili;
Infomobilità e sistemi di trasporto intelligenti;
Mobilità lenta;

Ambiti applicativi di interesse:
- Agrifood
- Chimica verde
- Energia
- Mobilità sostenibile
- Salute
- Smart, secure and inclusive communities

Asse prioritario II:
Sviluppare e migliorare sistemi di trasporto sostenibili dal punto di vista del l'ambiente (anche a bassa rumorosità) e a bassa emissione di carbonio, inclusi vie navigabili interne e trasporti marittimi, porti, col legamenti multi modali e infrastrutture aeroportuali, al fine di favorire la mobilità regionale e locale sostenibile

PROGRAMMAZIONE della COOPERAZIONE TERRITORIALE europea - programmi che comprendono l'Italia (e di interesse specifico per ambiente e territorio)

tra gli obiettivi generali può essere inclusa la RICERCA; altri assi prioritari/obiettivi possono essere legati ai temi di Inspiration prevedendo attività di ricerca pur non trattandosi di programmi volti prioritariamente a finanziare la ricerca

Finanziamento fondi FERS + cofinanziamenti delle regioni interessate **(fuori dall'Accordo)**

INTERREG: *(slide successive)*
- **Cross-border VA** : 8 programmi cooperazione transfrontaliera: Italia-Francia marittimo, Italia-Francia Alcotra, Italia-Svizzera, Italia-Austria, Italia-Slovenia, Italia-Croazia, Grecia-Italia, Italia-Malta; + 3 programmi di cooperazione transfrontaliera esterna co-finanziati da FESR e IPA (Italia-Albania-Montenegro) e da FESR e ENI (Italia-Tunisia e Mediterranean Sea Basin).
- **Transnational VB**: quattro di cooperazione transnazionale: Central Europe, Med, Alpine Space, Adriatic-Ionian.
- **Interregional VC**: 4 programmi di cooperazione interregionale (in cui partecipa l'Italia) che coinvolgono tutti i 28 Stati membri dell'UE:
  - *Interreg Europe – non di specifico interesse per territorio e ambiente (politiche per sviluppo e lavoro)*
  - *Interact*
  - *Urbact III*
  - *Espon*

INTERREG VA cross-border – programmazione 2014-2020

ALCOTRA : Interreg Francia – Italia
(Regioni NUTS: ITC11 – Torino, ITC16 – Cuneo, ITC20 – Aosta, ITC31 – Imperia, FR821 - Alpes-de-Haute-Provence, FR822 - Hautes-Alpes, FR823 - Alpes-Maritimes, FR717 – Savoie, FR718 – Haute Savoie)
http://www.interreg-alcotra.org/

- Asse prioritario III - Attrattività del territorio: Conservazione ambientale e valorizzazione delle risorse naturali e culturali, anche mediante lo sviluppo del turismo sostenibile e dell'economia verde

Interreg **Italia – Austria**
(Regioni: aree NUTS3 Bolzano - Bozen, Belluno, Vicenza, Treviso, Pordenone, Udine, Gorizia, Trieste e in Austria Klagenfurt – Villaco, Bassa Carinzia, Alta Carinzia, Lungau, Pinzgau – Pongau, Salisburgo, Innsbruck, Tiroler Oberland, Bassa Tirolo, Außerfern e Osttirol)
http://www.interreg.net/

- Asse prioritario 2: "natura e cultura" per la tutela dell'ambiente e della biodiversità, protezione del patrimonio culturale per mantenere e sviluppare gli habitat naturali e culturali.

Interreg **Italia-Francia Marittimo**
(Regioni: Corsica, Liguria, Sardegna, 5 province costiere della Toscana, dipartimento delle Alpi Marittime e dipartimento del Var - Regione Provence Alpes Côte d'Azur)
http://www.maritimeit-fr.net/

- Asse 3 - Risorse naturali e culturali: reti ecologiche e di protezione ambientale, monitoraggio e prevenzione dei rischi ambientali (marini), promozione delle energie rinnovabili, modelli di sviluppo sostenibile e approccio congiunto alle politiche regionali ambientali.

INTERREG VA cross-border– programmazione 2014-2020

Interreg **Italia -Slovenia**
(Regioni NUTS 3: province di Udine, Pordenone, Gorizia e Trieste, la provincia di Venezia, le regioni statistiche slovene di Notranjsko-primorska, Osrednjeslovenska, Gorenjska, Obalno-kraška e Goriška; regioni NUTS 2: Veneto, Friuli-Venezia Giulia, Vzhodna Slovenija e Zahodna Slovenija).
http://www.ita-slo.eu/ita/

- Asse prioritario 2 - Cooperare per l'attuazione di strategie e piani di azione caratterizzate da basse emissioni di carbonio.
- Asse prioritario 3 - Tutelare e promuovere le risorse naturali e culturali: proteggere e ripristinare la biodiversità e i suoli; promuovere servizi ecosistemici (Natura 2000); tecnologie innovative per migliorare la tutela dell'ambiente e l'uso efficiente delle risorse (settore rifiuti, acqua e con riguardo al suolo)

Interreg **Italia – Malta** 2014-2020 ??
(Regioni: Sicilia, Malta)
http://www.italiamalta.eu/

Priorità tematiche:
- (TO1) Ricerca e Innovazione;
- (TO5) cambiamento climatico e prevenzione del rischio;
- (TO6) Ambiente ed efficienza delle risorse

Interreg **Italia –Grecia** 2014-2020
(fase VAS?)
(Regioni: Prefetture di Etoloakarnania, Achaia, Corfu, Lefkada, Cephalonia, Zakynthos, Ioannina, Preveda, Thesprotia e province di Bari, Brindisi, Lecce)
http://www.greece-italy.eu/

Per una crescita inclusiva, sostenibile, smart … intorno al mar Ionio

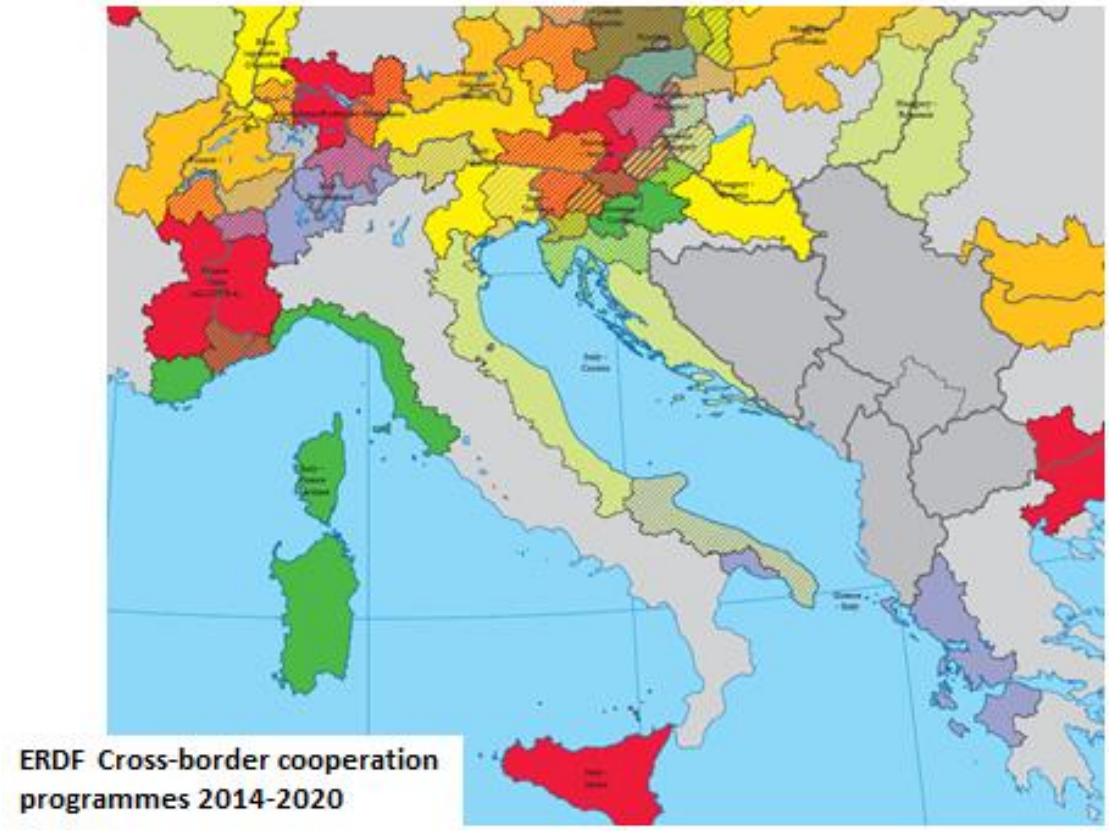
INTERREG VA cross-border– programmazione 2014-2020

Interreg **Italia-Croazia**
(Regioni NUTZ 3 Italia: province di Udine, Gorizia, Trieste, Pordenone, Venezia, Padova, Rovigo, Ferrara, Ravenna, Forlì-Cesena, Rimini, Pesaro e Urbino, Ancona, Macerata, Ascoli Piceno, Fermo, Teramo, Pescara, Chieti, Campobasso, Brindisi, Lecce, Foggia, Bari, Barletta-Andria-Trani; 8 regioni in Croazia)
http://www.regione.fvg.it/rafvg/cms/RAFVG/fondi-europei-fvg-internazionale/cooperazione-territoriale-europea/FOGLIA33/

- Asse prioritario 1 - Innovazione nell'economia blue: **rafforzare la ricerca**, lo sviluppo tecnologico e l'innovazione.
- Asse prioritario 2: - Sicurezza e resilienza: Promuovere l'adattamento al cambiamento climatico, la prevenzione e la gestione dei rischi.
- Asse prioritario 3 - Patrimonio ambientale e culturale: preservare e tutelare l'ambiente e promuovere l'uso efficiente delle risorse.

Interreg **Italia -Svizzera** 2014-2020
(in fase di negoziazione a ottobre 2015)
(Regioni: cantoni Vallese, Ticino, dei Grigioni; Province di Como, Sondrio, Lecco, Varese, Province di Biella, Novara, del Verbano Cusio Ossola, Vercelli, Valle d'Aosta, Provincia Autonoma di Bolzano.
http://www.interreg-italiasvizzera.it/home-it

Asse 2 - Valorizzazione del patrimonio naturale e culturale: uso efficiente e sostenibile delle risorse del territorio
Asse 3 - Mobilità integrata e sostenibile: sistema di trasporto sostenibile (economia, ambiente, società e cultura) e integrato.



ERDF Cross-border cooperation programmes 2014-2020

INTERREG IPA - VA cross-border cooperazione esterna (Instrument for Pre-Accession and European neighborhood Instrument) – programmazione 2014-2020

Interreg **Italia–Albania–Montenegro** (Regioni: Puglia e Molise, e due Paesi in pre–adesione, Albania e Montenegro)
http://www.europuglia.it/index.php?option=com_content&view=article&id=6939&Itemid=313

→ Asse 2 – gestione smart del patrimonio culturale e naturale per il turismo sostenibile transfrontaliero; Asse 3 – protezione dell'ambiente, gestione del rischio e strategie low carbon

INTERREG VA ENI (International Cooperation and Development) – 2014-2020

Interreg **Italia - Tunisia**
(Regioni: province di Agrigento, Caltanissetta, Ragusa, Siracusa, Trapani e governatorati costieri di Ariana, Beja, Ben Arous, Bizerte, Jendouba, Nabeul)
http://www.italietunisie.eu/index.php?lang=it

→ Obiettivo Tematico 2: Promuovere la formazione, la **ricerca**, lo sviluppo tecnologico e l'innovazione; OT3: Tutela dell'ambiente e adattamento ai cambiamenti climatici

Interreg **ENI CBC Med 2014-2020**
(14 paesi, 76 aree/regioni eleggibili: Cipro, Egitto, Francia, Grecia, Israele, **Italia**, Giordania, Libano, Malta, Stato di Palestina, Portogallo, Spagna, Siria, Tunisia)
http://www.enpicbcmed.eu/enicbcmed-2014-2020

→ Obiettivo 1 – Economia e sviluppo sociale: (OT2) educazione, **ricerca**, sviluppo tecnologico e innovazione; Ob. 2 – Sfide ambientali comuni: protezione dell'ambiente, adattamento e mitigazione del cambiamento climatico

INTERREG VB - transnational – programmazione 2014-2020

Interreg **Mediterranean - MED** :
(10 Stati, 57 regioni: Croazia, Cipro, Francia, Grecia, Malta, Portogallo, Slovenia, Spagna, Regno Unito, **Italia**: Abruzzo, Puglia, Basilicata, Calabria, Campania, Emilia-Romagna, Friuli-Venezia Giulia, Lazio, Liguria, Lombardia, Marche, Molise, Piemonte, Sardegna, Sicilia, Toscana, Umbria, Valle d'Aosta, Veneto)
http://interreg-med.eu/en/home/

→
- Asse prioritario 1: "Smart Med" - promoting Mediterranean innovation capacities to develop smart and sustainable growth (blue and green);
- Asse prioritario 2: "Low Carbon" - fostering low carbon strategies and energy efficiency in specific MED territories: cities, islands and remote areas;
- Asse prioritario 3: "Med Resources" - protecting and promoting Mediterranean natural and cultural resources (natural and cultural heritage, biodiversity) focusing on the development of human activities in coherence with environmental change.

CENTRAL EUROPE: (76 regioni NUTS 2 in Austria, Croazia, repubblica Ceca, Germania, Ungheria, Polonia, Repubblica Slovacca, Slovenia e in **Italia**: Emilia-Romagna, Friuli-Venezia Giulia, Liguria, Lombardia, Piemonte, Provincia Autonoma Bolzano, Provincia Autonoma Trento, Valle d'Aosta)
http://www.interreg-central.eu/

→
- Asse prioritario 2 – cooperare per la promozione di strategie **low carbon**: soluzioni per aumentare l'efficienza energetica e l'uso dell'energia rinnovabile nelle infrastrutture pubbliche; strategie di pianificazione energetica low carbon e le politiche di sostegno mitigazione dei cambiamenti climatici; implementazione della mobilità nelle aree urbane;
- Asse 3 – risorse naturali e culturali per la crescita sostenibile dell'Europa centrale: gestione ambientale integrata; migliorare la gestione ambientale delle **aree urbane**.

INTERREG VB - transnational – programmazione 2014-2020

Alpine Space
(5 paesi: Austria, Francia, Germania, Slovenia, **Italia** - Lombardia, Friuli Venezia Giulia, Veneto, Trentino-Alto Adige, Valle d'Aosta, Piemonte, Liguria
http://www.it.alpine-space.eu/

- Asse 2 – Spazio alpino a basse emissioni di carbonio: strategie per basse emissioni di carbonio; mobilità e trasporto sostenibili;
- Asse 3 - Spazio alpino vivibile: patrimonio naturale e culturale (turismo sostenibile); biodiversità ed ecosistemi (strategie e modelli per la gestione sostenibile e innovativa delle risorse, delle infrastrutture verdi e della biodiversità, della gestione del paesaggio e dei corridoi verdi)

Adriatic-Ionian
(4 stati membri UE: Croazia, Grecia, Slovenia e **Italia**: Friuli Venezia Giulia, Veneto, Emilia-Romagna, Marche, Abruzzo, Molise, Puglia, Calabria, Sicilia;
4 paesi non UE: Albania, Bosnia Herzegovina, Montenegro, Serbia)
http://adriatic-ionian.eu/

- Pillar 1. Crescita blu;
- Pillar 3. Qualità ambientale (Topic 2 - habitat terrestri transnazionali e biodiversità); P4. Turismo sostenibile;
- Tematiche trasversali: **ricerca e innovazione** e capacity building

FINANZIAMENTI DIRETTI (tutti peasi UE)

LIFE: programma pluriennale 2014-2017

Obiettivi generali del programma:
- Promozione di un'economia efficiente in termini di risorse, con minori emissioni di carbonio e resiliente ai cambiamenti climatici
- Protezione e miglioramento della qualità dell'ambiente e conservazione della biodiversità, compresi il sostegno alla rete Natura 2000 e il contrasto al degrado degli ecosistemi;
- Implementazione della politica e della legislazione ambientale e climatica dell'Unione;
- Sostegno alla governance ambientale e in materia di clima a tutti i livelli attraverso la partecipazione.

Temi principali:
- Natura e biodiversità Ambiente
- Azione per il clima

HORIZON 2020 - Ricerca e Innovazione

Aree del programma: Agriculture & Forestry, Aquatic Resources, Bio-based Industries, Biotechnology, Energy, Environment & Climate Action, Food & Healthy Diet, Funding Researchers, Health, ICT Research & Innovation, Innovation, International Cooperation, Key Enabling Technologies, Partnerships with Industry and Member States, Raw Materials, Research Infrastructures, Security, SMEs, Social Sciences & Humanities, Society, Space, Transport.

Sezioni:
- Excellent science
- Industrial leadership
- Societal challenges
- Spreading Excellence & Widening Participation
- Ecc.

Annex Ie: Workshop Agenda

INSPIRATION

INTEGRATED SPATIAL PLANNING, LAND USE
AND SOIL MANAGEMENT RESEARCH ACTION

www.inspiration-h2020.eu

Workshop Nazionale

26 - 27 Novembre 2015

PROGRAMMA

SiTI - Corso Castelfidardo 30, Torino

INSPIRATION acknowledges the received funding from the European Community's HORIZON2020 Framework Programme under grant agreement no 642572

Giovedì 26

Ora	Attività
13.00	Buffet di benvenuto
14.00	Saluti di benvenuto – *Giulio Mondini, direttore SiTI*
14.10	Introduzione al progetto INSPIRATION – *Matteo Tabasso, NFP*
14.30	Presentazioni del National Report – *Sarah Chiodi*
14.50	Presentazione delle attività – *Giulia Melis*
15.00	World Café, 3 tavoli a rotazione per integrare, completare e indicare le priorità sui temi: a. Agenda di Ricerca Strategica – SRA b. Interfaccia tra politiche e ricerca - SPI c. Opportunità di finanziamento
17.30	Prossimi passi e chiusura
20.00	Cena presso il ristorante Arcadia - Galleria Subalpina, Piazza Castello

Venerdì 27

Ora	Attività
09.00	Bentornato, obiettivi del giorno e introduzione
09.15	Presentazione plenaria degli esiti dei tavoli di lavoro (*world café*) seguita dalla raccolta di ulteriori commenti e indicazioni relativi alle priorità.
11.15	Coffee break
11.40	Sintesi e finalizzazione degli input per il Report Nazionale in 3 Working Group predefiniti a. Agenda di Ricerca Strategica - SRA b. Interfaccia tra politiche e ricerca - SPI c. Opportunità di finanziamento
12.30	Chiusura
13.00	Buffet

Annex II: Documents used for the IT desk study

Among the numerous document consulted we cite the main one available on line:

- Comba R. *et al*. (2014), “Le aree ad alto rischio ambientale in Italia”, in *Ecoscienza*, n. 1
- Know4DRR, june 2015 http://www.know4drr.polimi.it/
- JPI FACCE, 2012, Stretegic Research Agenda on Agriculture, Food Security and Climate Change. Available at www.faccejpi.com
- Regione Piemonte, 2015, Rural Urban Governance (RURBANCE): Torino Ciriacese e Valli di Lanzo rafforzamento delle potenzialità del territorio. Available at http://www.regione.piemonte.it/territorio/iniziative/rurbance.htm
- Borrelli G. (a cura di), 2015, La sostenibilità ambientale. Manuale, Available at http://www.enea.it/it/pubblicazioni/pdf-volumi/v2015-la-sostenibilita-ambientale.pdf
- Ministero delle politiche agricole, alimentari e forestali (MIFAAF), 2014, La strategia per l’innovazione e la ricerca nel settore agricolo alimentare e forestale 2014-2020.
- Italian National Agency for the Evaluation of the University and Research Systems (ANVUR), 2015, Linee guida per la compilazione della scheda unica annuale della ricerca dipartimentale. Available at http://www.anvur.org/index.php?lang=it
- European Commission, Agenzia per la coesione territoriale, 2014, Accordo di partenariato 2014-2020–Italia. Available at http://www.agenziacoesione.gov.it/it/AccordoPartenariato/index.html
- Comba R. et al., 2014, Le aree ad alto rischio ambientale in Italia, in Ecoscienza, n. 1
- Norton J., Chantry G., Gordon C., 2014, Enabling knowledge for disaster risk reduction in integration to climate change adaptation (Know4DRR): Mapping exchange of knowledge to support DRR. Deliverable 2.2., available at http://www.know4drr.polimi.it/
- Robinson D., Bylund J., Coutard O.et alii, 2015, Transition Towards Sustainable and Liveable Urban Futures. The Strategic Research and Innovation Agenda of JPI Urban Europe. Available at http://jpi-urbaneurope.eu/
- Water Joint Programming Initiative (JPI), 2014, Strategic Research and Innovation Agenda. Available at http://www.waterjpi.eu/
- Joint Programming Initiative Connecting Climate Change Knowledge for Europe (JPI Climate), 2011, Strategic Research Agenda. Available at http://www.jpi-climate.eu/home

Annex III: Complete list of societal challenges and related questions as mentioned in the interviews (in Italian)

The complete list is available at the INSPIRATION website, see: www.inspiration-h2020.eu

9. Poland

Report by Anna Starzewska-Sikorska

9.1 Executive summary

9.1.1 English version

In the framework of the Polish NFP work the main social challenges and needs have been identified.

1. Safe environment is a serious social challenge. People still in some regions are exposed to environmental risk connected with polluted soil. There is food production on areas with increased level of pollution. There is no policy, no risk management. There should be a system connected with financial analysis but also with education of producers and consumers.

2. The problem of water protection against impact of agricultural activities on surface waters. Farmers should be educated how to limit this impact by using less fertilizers (especially nitrogen).

There is also a serious threat to soils by using them for non-agricultural purposes. There is a loss of the best soil. 30% of soil in Poland is the best quality soil. It is connected with the food safety and effective use of soil resources.

3. Education is necessary of general public. Especially concerning pro-ecological solutions in cities, long-term consequences of decisions, e.g. concerning new solutions of transport. Education should be conducted on all levels. From small children to adults. People have to be confirmed about advantages and threats of selected solutions, they should have this knowledge to be aware of the results of certain decisions they are participating in.

There is also a need for collecting information on EU reports concerning soil. Reports presenting shortly and in simple language the results and conclusions and also recommendations which would support national policies.

The main topics proposed after interviews and workshop as well as desk research are:

PL-1: Climate change mitigation and adaptation

Climate change is considered as more and more serious problem in Poland. Particularly floods (especially so called urban floods) and extreme temperatures as well as droughts are phenomena which require activities both in the sphere of mitigation and adaptation. Land management can be a strong instrument supporting development and implementation of counteracting negative phenomena resulting from climate change in urban areas.

How to adapt to climate change by an appropriate urban land planning and management?

PL-2: Threats to soil

In Poland a number of threats to soil have been identified. Among them erosion is perceived as a serious problem as 40% of soil is exposed to erosion.

Questions arise: How to protect arable land in urban areas? How to value a demand for various functions? There is also a need for new criteria of soil assessment regarding bio-availability as it is a significant factor of a real exposure to heavy metals in soil.

PL-3: Soil in urban areas

A multi-functional role of soil in urban areas becomes more and more important especially in the climate change conditions and the need for adaptation to this change. Also agricultural valuable soil is threatened in urban areas. In Poland 30% of agricultural land is within urban areas. On urban areas an ecosystem should be kept, better soils should be protected on these areas to keep the habitat, to provide ecosystem functioning. There is a need for raising awareness among administration and land use planning professionals on the role of soil in urban areas. Therefore there is a need for better identification and evaluation of the role of soil in urban areas.

PL-4: Planning in urban areas

A new paradigm is necessary that that nature is a superior value that should constitute a basis for all further decisions and actions in the space. These values should indicate the most appropriate functions and ways of the use of a particular land as it used to be practiced in the past.

PL-5: Platform for public policy to protect land and soil

Rules should be developed how to support decision making processes in the field of land and soil management. It can be based on public choice theory. Each decision is taken with the awareness what we achieve and what we lose. The reports concerning the field concerning land and soil should also present how social challenges are met or what is lost. It should be clearly expressed to the decision makers. And even better if the report is presenting what can be achieved – in a positive way.

PL-6: Degraded land in urban areas

A new methodology is necessary of risk management connected with degraded areas in the context of urban revitalization programs. It should constitute a model of analysis of various alternatives including a number of scenarios of remediation technologies (if necessary), possible functions, sites potential and needs of a city development.

Science-policy interface issues in Poland

The problem is that research has an initiative, researchers identify the problem and search for solution. Then policy is using the results if they are coherent with the policy aims and objectives. These aims and objectives of the policy programs are answering to social challenges but the policy is using only these research results which are necessary to implement their programs. Therefore policy is not putting questions – it is only using ready solutions.

It is important how researchers contribute to their project implementation. This implementation should be regarded from the very beginning of the project and should be developed parallel to the research itself. Also the project authors should formulate conclusions in a practical form to show what consequences concerning social challenges will take place after the project implementation.

The main gaps in financing research in Poland

There used to be a system of national programs concerning selected thematic blocks most important for the national economy and development. It has been expressed that there is a need for continuation of such a system, but now it is difficult to indicate who could initiate it.

National Fund for Environmental Protection and Water Management declares supporting various research initiatives. Now there are organized national meetings devoted to selected fields of environmental research, which can be a kind of platform for exchanging ideas of further research agenda.

There is a wide research area that is not covered by any funding mechanisms – economic aspects in ecological projects.

9.1.2 Polish version

W ramach prac Krajowego Punktu Kontaktowego projektu INSPIRATION zidentyfikowane zostały następujące problemy i potrzeby społeczne.

1. Poważnym problemem społecznym jest bezpieczne środowisko. Ciągle jeszcze istnieje zagrożenie związane ze skażeniem gleb. Odbywa się produkcja żywności na terenach o podwyższonej zawartości zanieczyszczeń. Nie ma odpowiedniej polityki, nie ma zarządzania ryzykiem. Należy wprowadzić system zarządzania ryzykiem a także szerzej prowadzić edukację producentów i konsumentów.

2. Jest problem związany z zagrożeniem wód powierzchniowych działalnością rolniczą. Należy szerzej podnosić świadomość rolników o tych zagrożeniach i informować o konieczności redukcji stosowania nawozów (szczególnie azotu). Istnieje tez poważne zagrożenie gleb przez użytkowanie najbardziej wartościowych klas pod inne funkcje. Około 30% gleb w Polsce to gleby najwyższej klasy. Ochrona tych gleb wiąże się z bezpieczeństwem żywności i efektywnym wykorzystywaniem zasobów glebowych.

3. Edukacja społeczeństwa jest konieczna. W szczególności w dziedzinie rozwiązań pro-ekologicznych i ich długoterminowych skutków, np. w przypadku transportu w miastach. Edukację należy prowadzić we wszystkich grupach: od dzieci po dorosłych. Społeczeństwo powinno być uświadamiane o korzyściach i zagrożeniach wybranych rozwiązań, szczególnie, kiedy ma możliwość uczestniczyć w podejmowaniu decyzji.

Istnieje także potrzeba szerszego udostępniania wyników badań w formie przyswajalnej dla przeciętnego obywatela.

W czasie przeprowadzonych wywiadów i warsztatów sformułowane zostały następujące propozycje kierunków badawczych:

PL-1: Mitygacja i adaptacja do zmian klimatu

Zmiany klimatu są w Polsce postrzegane jako poważny problem. W szczególności zjawiska powodzi (tzw. miejskich powodzi) oraz ekstremalnych temperatur a także suszy wymagają podjęcia działań w zakresie mitygacji i adaptacji. Gospodarowanie przestrzenią może stać się bardzo silnym i efektywnym narzędziem wspierającym przeciwdziałanie negatywnym zjawiskom wynikającym ze zmian klimatu w obszarach miejskich.

W jaki sposób wykorzystać planowanie i zarządzanie przestrzenią w adaptacji do zmian klimatu?

PL-2: Zagrożenia gleb

Wskazano na główne zagrożenia gleb w Polsce. Wśród szczególnie podkreślono erozję jako poważny problem zagrażający 40% gleb.

Powstają pytania: w jaki sposób chronić gleby na terenach miejskich? Ważną kwestią jest również wypracowanie kryteriów oceny gleb uwzględniających biodostępność, jako że jest to istotny czynnik decydujący od faktycznym narażeniu na zanieczyszczenie gleb metalami ciężkimi.

PL-3: Gleby na terenach miejskich

Wielorakie funkcje gleb w obszarach miejskich stają się coraz bardziej doceniane, szczególnie w kontekście zmian klimatu i potrzeby adaptacji do tych zmian. Gleby wysokiej klasy na terenach miejskich są zagrożone, w Polsce 30% tych gleb znajduje się na terenach miejskich. Istnieje potrzeba ochrony funkcjonowania ekosystemów, należy ten wymóg uwzględniać w planach zagospodarowania przestrzennego, stąd potrzeba uświadamiania wagi tych problemów profesjonalistom.

PL-4: Planowanie terenów miejskich

Konieczny jest nowy paradygmat głoszący nadrzędność przyrody i procesów przyrodniczych, które powinny być podstawą decyzji rozwojowych szczególnie w kontekście gospodarowania przestrzenią. Te wartości powinny wskazywać najbardziej odpowiednie funkcje i sposoby wykorzystywania terenów jak to miało miejsce w przeszłości.

PL-5: Platforma polityki publicznej dla ochrony gleb i terenów

Należy wypracować zasady, w jaki sposób powinny być przez naukę wspierane decyzje w zakresie zarządzania terenami i glebą. Każda decyzja powinna być oparta na analizie, co zyskujemy a co tracimy. Wyniki badań dotyczących tematyki terenów i gleb powinny wskazywać, w jaki sposób zostaną spełnione cele społeczne lub co zostanie utracone. To powinno być jasno przedstawiane decydentom.

PL-6: Tereny zdegradowane w obszarach miejskich

Niezbędna jest nowa metodologia zarządzania ryzykiem związanym z terenami zdegradowanymi w kontekście programów rewitalizacji. Potrzebny jest model analizy różnych wariantów obejmujących scenariusze włączające technologie remediacji, możliwe funkcje wykorzystania terenu, potencjał terenów oraz potrzeby rozwojowe miasta.

Powiązanie nauka-polityka w Polsce

Politykę się prowadzi, żeby osiągnąć pewne cele. W związku z tym politycy, władza publiczna wykorzystują te wyniki badań, które są zgodne z ich celami. Partie polityczne określają cele na podstawie wiedzy o wyzwaniach ale potem korzystają tylko z tej wiedzy, która jest potrzebna do realizacji tych programów. A więc nie sięgają po badania z tych wyzwań, polityka nie napędza tych badań, nie formułuje potrzeby tych badań. Nie zwraca się do nauki żeby cos zbadać. Badania są w dużej części inicjowane na podstawie rozeznania samych naukowców, widzą problem, stwierdzają, że trzeba podjąć badania, żeby go rozwiązać.

Implementacja badań powinna być elementem tych badań. Powinna być uwzględniana od początku każdego projektu. To jest zaniedbanie metodologiczne. Argumenty naukowe muszą być odpowiednio formułowane, żeby przekonać polityków do zastosowania wyników badań.

Główne luki w finansowaniu badań w Polsce

W ubiegłych latach były w Polsce realizowane programy rządowe dotyczące wybranych kluczowych zagadnień najważniejszych dla gospodarki i rozwoju kraju. Istnieje potrzeba kontynuacji tego rodzaju finansowania nauki.

Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej deklaruje wspieranie różnych inicjatyw naukowych. Organizuje spotkania w skali kraju poświęcone wybranym zagadnieniom z zakresu ochrony środowiska. SA to platformy wymiany informacji o potrzebach a także ofercie NFOŚiGW finansowania badań.

Należy podkreślić silną potrzebę szerokich badań w zakresie aspektów ekonomicznych w zagadnieniach środowiskowych.

9.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for Poland. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation”. In Poland, 17 NKS were interviewed. Details on these NKS are provided in Annex Ia. The desk study was based on documents as suggested by NKS.

The national workshop took place on 5-6 November 2015. 18 participants have worked for two half-days in a “World Café” system.

First they have been introduced to the concept of INSPIRATION and the purpose of the workshop. Then there was a theoretical presentation on ecosystem serivices approach.

The “World Café” method has been used and the participants were working at following hree tables:

- **Table 1**
  RESOURCES – LAND, SOIL
  Social challenges
- **Table 2**
  NATURAL CAPITAL
  Ecosystem services, natural potential
- **Table 3**
  LAND MANAGEMENT
  Integration of demand and natural capital

The groups have been formed in order to provide representatives of all fields: research, bussiness, administration and finances.

The whole discussion at three tables was recorded. During the final session – in plenary – the proposed research agenda has been agreed basing on the summarized results of discussions.

The present report has been sent to stakeholders for possible comments and final approval.

9.3 Research and Innovation (R&I) needs

9.3.1. Societal challenges and needs

Below there are comments on social challenges in reference to the project subject. These comments have been cited from interviews with National Key Stakeholders.

1. Fees for water. They are very low but they cannot be increased - it is a problem of social sensitivity. But there is a question: what percentage in the fee for water is taken by the costs of water supplying company functioning and how much is used for environmental costs? It is one of the economic aspects. There is a need for including of economic aspects in environmental management.
2. Safe environment is a serious social challenge. People still in some regions are exposed to environmental risk connected with polluted soil. There is food production on areas with increased level of pollution. There is no policy, no risk management. There should be a system connected with financial analysis but also with education of producers and consumers.
3. The problem of water protection against impact of agricultural activities on surface waters. Farmers should be educated how to limit this impact by using less fertilizers (especially nitrogen).
   There is also a serious threat to soils by using them for non-agricultural purposes. There is a loss of the best soil. 30% of soil in Poland is the best quality soil. It is connected with the food safety and effective use of soil resources.
4. Education is necessary of general public. Especially concerning pro-ecological solutions in cities, long-term consequences of decisions, e.g. concerning new solutions of transport. Education should be conducted on all levels. From small children to adults. People have to be confirmed about advantages and threats of selected solutions, they should have this knowledge to be aware of the results of certain decisions they are participating in.
   There is also a need for collecting information on EU reports concerning soil. Reports presenting shortly and in simple language the results and conclusions and also recommendations which would support national policies.

9.3.2. Topics / research needs to include in the SRA

Different topics and research needs related to the societal challenges are retrieved from the interviews, desk-study and the national workshop. Underneath the main topics are introduced and for each topic the main research questions are summarized under INSPIRATION themes “demand”, “natural capital”, land management” and “impact”.

PL-1: Climate change mitigation and adaptation

Climate change is considered as more and more serious problem in Poland. Particularly floods (especially so called urban floods) and extreme temperatures as well as droughts are phenomena which require activities both in the sphere of mitigation and adaptation. For 30 big Polish cities (above 100 thous. inhabitants) climate change adaptation plans will be worked out in the next 1-2 years basing on general guidelines presented by the Polish Ministry of Environment. But there is also a need for looking at the problem in the country scale. It should be underlined that the registered losses connected with the climate changes during 2001 – 2010 years had amount of 54 billions Polish new zlotys. In case of doing-nothing the possible in future costs of losses are estimated on about 86 billions Polish new zlotys until 2020 and additional 119 billions Polish new zlotys during 2021-2030.

Methods of climate change mitigation include i.a. increase of forest/green areas. In Poland there is a problem of CO2 emission and it is considered to use the technology of loading CO2 into underground post-mining excavations. There is a need of research on the efficiency of various technologies and solutions aiming at climate change mitigation in the country scale. It can show up that e.g. planting trees/ increasing forests area would be more effective and could bring additional positive effects such as better living conditions (decreasing of heat waves in urban areas, keeping humidity etc. contributing to climate change adaptation).

Land management can be a strong instrument supporting development and implementation of counteracting negative phenomena in urban areas. Space is a limited resource. It should be used rationally, the land management should avoid extensive use of land. It results in urban sprawl. We should also use the land in coherence with climate change adaptation. For instance in Poland there are plans for housing areas exceeding significantly the needs. It has been estimated that we have housing areas in plans for about 130 mln and for the nearest 300 years.

Specific research questions:

Demand:

Balancing between demand and use of the resources is weak. The demand is not estimated, therefore too much resources is used (networks, infrastructure, significant fragmentation). Such a balance would be a basis for new policies. How much land do we need?

Natural capital

Climate change adaptation solutions use ecosystems approach in urban planning. The ecosystem approach acknowledges the equal importance of both environmental and anthropogenic components in urban areas. These components are integrated into the circulation of water, air and other elements necessary for the city to function and they also provide equally important services for the city's inhabitants.

How to use ecosystem serivices approach in urban planning aiming at climate change adaptation?

Land management

There is a need to work out land management instruments supporting climate change adaptation in urban areas.

How to adapt to climate change by an appropriate urban land planning and management ?

What kind of legal and economic instruments would support land management efficiency? (e.g. possibilities of use of frozen areas inside the city – in order to counteract extensive use of land inside the city).

There is a need for new methods of land use planning. Land use planning theory is necessary. The land use plan should look different than it used to look. Today there is a play of interests and the local self-government is just one of the players. Investors dictate conditions, otherwise they go somewhere else.

Impact

How climate change adaptation measures will contribute to decreasing negative effects of climate change?

PL-2: Threats to soil

In Poland a number of threats to soil have been identified. The consequences of these threats are directly to soil productive values but also they generate impact on other natural resources and on human health. Among them the most important are: soil erosion, soil acidification, impact of pigs inbreeding (excessive amount of nitrogen in soil), dusting from industrial wastes dumping sites.

Erosion is a significant factor, which has to be taken into consideration in soil threat assessment. In Poland 40% of soil is exposed to erosion. Erosion is a physical process which has significant chemical consequences connected with secondary dusting, threatening the environment including water and sediments.

Therefore there is a need for answer to the question what part of pollution is transferred to water and sediments, estimation is needed to what extend erosion is contributing to this pollution. It is also important to investigate the impact of climate change on erosion. In this case both heavy rains and long-term droughts have to be taken into account.

Specific research questions:

Demand:

How to protect arable land in urban areas? How to value a demand for various functions?

Development of new standards of soil examinations.

Natural capital

There is a problem of bio-availability of pollution in soil. It is important to know, how high the level of bio-availability is. It happens that there is low level of pollution but the bio-availability is high and another way round.

How to involve bioavailability factor in soil quality assessment criteria?

There is a need for monitoring of soil and changes in the soil. It should be a multi-year program of soil changes observation including new methods of soil protection against climate change, protection of biodiversity (plants, birds, mammals).

To this end a common policy of ministries of agriculture and environment is necessary in order to counteract factors threatening soil.

New instruments for assessment of changes in soil – identification of synergies, risk mechanisms, acidification, loss of organic matter cumulated mechanisms. There is a need for assessment of these mechanisms.

Land management

How can land management counteract soil erosion?

Impact

Estimation of pollution caused by emission from soil erosion and its impact on water and sediments.

How to measure climate change impact on soil erosion?

PL-3: Soil in urban areas

Soils in urban areas are threatened with using them under various functions. In case of agricultural soil it is a serious threat. In Poland 30% of agricultural land is within urban areas.

On urban areas an ecosystem should be kept, better soils should be protected on these areas to keep the habitat, to provide ecosystem functioning. E.g. soil is functioning as a water reservoir (40% of soil is porosity). In order to provide a cooling effect better soils have better “water” efficiency.

This important function and other services offered by soil in urban areas are not perceived by land management and urban administration. Soil is only treated as a set of parameters.

There is a need for raising awareness among administration and land use planning professionals on the role of soil in urban areas. It is a long process but it should be started in order to achieve the situation when soil values and role will be regarded as important factor in decision making. Similarly as in case of conservation of monuments it is not negotiated in planning decisions we should achieve the situation when conservation of valuable soil will not be negotiated in planning documents. Specific research questions:

Demand

What is a loss of soil habitat quality resulting from changing functions of urban areas?

Need for methodology of multi-criteria analysis and assessment.

Natural capital

How to use valorization of natural areas including their ecological services for sustainable use of land in urban space?

Land management

Problem of soil in urban areas. There is a need of joining the soils management and land use management in urban areas. The urban soil is not protected in Poland, where 30% of agricultural soil is in urban areas. There is no an appropriate approach to soil management in land use planning. It is also connected with changing the agricultural function into different one (e.g. housing) therefore in a consequence we have a significant fragmentation of the landscape in urban areas. Soil is not protected in urban areas. Soil is perceived only as a resource for agricultural purposes. Other ecological services of soil especially in urban areas are not appreciated.

How to ensure soil protection in urban planning and management?

Impact

The role of soil in urban areas seems to be more and more important especially in a present threats coming from climate change impact. In a global scale this threat is visible in all urban areas. Therefore there is a need of scientific argumentation to what extent ecosystem services in urban areas can contribute to decrease the climate change negative impact. It would be particularly useful in urban climate change adaptation plans. It would also be an argument supporting decision making processes for the authorities.

To what extent ecosystem services in urban areas can contribute to decrease the climate change negative impact?

PL-4: Planning in urban areas

In Poland the process of planning in urban areas is not meeting the requirements of an appropriate sustainable land use. There are lacks of instruments and also the role of planning is not appreciated by the urban authorities and other actors of the urban development process. Planning has lost its character of long-term vision supported by recognition of the social challenges and natural values.

Plans are often following the results of ad hoc economic decisions dictated by market criteria and not regarding a wider social, environmental and spatial consequences of these decisions.

There are barriers in a legal system but also the awareness is lacking of the need of good modern planning.

Planning should use the results of research in other fields such as law, biology, sociology, environmental engineering. And at the same time planning should work out its own new paradigm, which would fit to the present relations.

In this paradigm it should be proclaimed that nature is a superior value that should constitute a basis for all further decisions and actions in the space. These values should indicate the most appropriate functions and ways of the use of a particular land as it used to be practiced in the past. Then people started to neglect these values and rules and now we have the consequences in a number of negative effects in local and global scale.

Nowadays planning does not have efficient instruments which would support counteracting extensive use of land. There are abandoned areas inside cities which cannot be touched for years due to various barriers.

Specific research questions:

Demand

Geochemical and biochemical atlas of areas in a scale useful for local land use planning

There is a need for better identification of soil quality and state by construction of maps of a large scale to be used for local (municipal) land use plans. It is also important in the context of the impact of brownfields - especially these polluted with heavy metals and hydrocarbons - on underground water resources. The lack of information on brownfields soil and ground quality (pollution level) is also a barrier for further planning of new functions on an area. Such atlas could be based on geochemical and biochemical investigations and give the picture on the potential of the land resources in urban areas, also in the aspect of risk connected with this pollution.

What kind of maps and data bases are needed for localland use planning especially in the case of degraded areas?

Natural capital

Development of the system of monitoring changes in urban area which would be a basis for long-term strategic vision of urban development. It would include natural, social and economic parameters.

Valorization of natural features of the urban area as a basis for planning decisions.

Maps of soil in urban areas as a basis for decisions on new functions. The maps would value usability of an area for a certain function. Then scenarios would show what will be lost or what will be gained. But the decision would be taken in a full awareness of the consequences.

What kind of a monitoring system should be developed for long-term strategic urban development planning including natural, social and economic aspects?

Land management

Land management will be closely connected with the new planning. It will be implementing the land use plan.

Development of methods for economic analysis of alternatives of infrastructure solutions (water supply, sewage networks, energy supply etc.) in remote settlements resulting from urban sprawl. It may show that local solutions in small scale can be more economically effective (in costs of construction and maintenance) than integration with distant urban networks. It is a long-term perspective but in face of a further trend of urban sprawl it might be a solution decreasing at least some negative effects.

How to involve economic analysis of the urban sprawl consequences as a basis for land management and planning?

Impact

What methods should be developed for analysis of social, natural and economic consequences of plan implementation?

PL-5: Platform for public policy to protect land and soil

The project relates to science – policy interface. It is a general problem of implementation of projects results. Usually scientific projects present conclusions without taking care of the further life of the project. There are no ideas how to implement these results. If the project should serve as a basis for certain policy, it should be performed with the clear idea of its implementation from the very beginning. It can be a general rule for all kinds of projects. But in case of land and soil protection and sustainable use it is particularly important to involve policy makers from the very beginning. They should be informed about short-term and long-term consequences of the project implementation. Sometimes the consequences appear very long after some decisions or activities. We should know long before what happens after for instance we will clean a certain area.

The platform would provide documents for policies to give evidence for certain decisions. It is evidence based policies. Documents should include scenarios of future development models with e.g. ecological criteria to show what can happen in a consequence (economic, social and environmental) of such scenario implementation.

Specific research questions:

Demand

Development of rules how to support decision making processes in the field of land and soil management. It can be based on public choice theory. Each decision is taken with the awareness what we achieve and what we lose. The reports concerning the field concerning land and soil should also present how social challenges are met or what is lost. It should be clearly expressed to the decision makers. And even better if the report is presenting what can be achieved – in a positive way.

Social challenges should be the objectives of activities in protection of soil or protection of land. Consequences of any activity should be shown in the context of social challenges. Then it is understood better by the politicians and decision makers.

It is difficult to convince authorities that construction of an object on valuable soil is threatening to this soil. Much easier is to say that it is dangerous to the inhabitants, because it is against social challenges.

What kind of roles should be developed supporting decision making processes in the field of land and soil management and planning?

Land management

Examples of good practice – reports, guidelines based on good practice. Examples of projects serving for evidence based policies.

Guidebook of good practices could present examples of good planning regarding soil management. It would show modern planning which takes into account other spheres of life.

What kind of a guidebook should be worked out of good practices presenting examples of good planning regarding soil management?

PL-6: Degraded land in urban areas

In Poland degraded areas still occupy a significant part of urban spaces. They include post-industrial areas but also more and more abandoned buildings and other sites not used for any function.

According to the new act on revitalization (from June 2015) towns have to provide urban revitalization programs. It is a requirement if a city is going to apply for funds for revitalization. The act imposes a number of requirements concerning also definition of revitalization. It has to include both social and technical revitalization of so-called “crisis areas”.

Therefore cities have started with the work on revitalization programs. Despite this work it is still a need for further methodology of management of these degraded areas in the scale of the whole city. Specific research questions:

Demand

Methodology of risk management connected with degraded areas in the context of urban revitalization programs. It should constitute a model of analysis of various alternatives including a number of scenarios of remediation technologies (if necessary), possible functions, sites potential and needs of a city development. It also should regard short and long-term horizon and the scale of the whole city.

Methods of forestation of degraded areas according to site condition and needs of a city. The project would also support a system of compensation planting of trees in urban areas.

How to develop methodology of risk management connected with degraded areas for comprehensive revitalization programs?

What kind of soil treatment technologies should be further developed to support urban revitalization programs?

Natural capital

Analysis of the natural potential of areas needed for a city sustainable development. It should be necessary for estimation of the areas of the regenerated sites which would release natural areas necessary for improving city natural condition.

How to involve analysis of the natural potential of areas needed for a city sustainable development?

Land management

Valorization of the city space using scenario analysis. It is particularly important in the context of degraded areas which also should be taken into account in the analysis after their remediation or regeneration.

What kind of scenario analysis methods should be used for valorization of a city space in various alternatives of land remediation or regeneration?

Impact

How to estimate level of ecosystem services of urban areas achieved after implementation of scenarios including recycling of degraded areas?

9.4 Experiences regarding connecting science to policy/practice

9.4.1 Use of knowledge

It is important how researchers contribute to their project implementation. This implementation should be regarded from the very beginning of the project and should be developed parallel to the research itself. Also the project authors should formulate conclusions in a practical form to show what consequences concerning social challenges will take place after the project implementation. It is a task of the researchers. It is not a project proposal but it should be taken into consideration by all researchers. It is a question of the science-policy interface.

Education is needed of local and regional public authorities concerning risk management to protect human health connected with food production on polluted soil.

The results of projects should be published in a synthesized form also with the non-technical summary.

9.4.2 Possibilities to set the agenda

According to the statements in the interviews in this subject there is an opinion, that the present national agendas do not reflect the specific needs and priorities expressed in the discussions.

9.4.3 Science – policy – practice

The problem is that research has an initiative, researchers identify the problem and search for solution. Then policy is using the results if they are coherent with the policy aims and objectives. These aims and objectives of the policy programs are answering to social challenges but the policy is using only these research results which are necessary to implement their programs. Therefore policy is not putting questions – it is only using ready solutions.

The research projects are initiated by the researchers. They see the problem and undertake research to solve it. In most cases they the results are not communicated in a right way to the policy makers. So there is a lck of communication from both sides: policy makers do not express their needs for research and researchers do not present the results of their work. Unless policy makers find the project as useful for their policy objectives.

It seems that new forms of organization of co-operation are needed in the relation science-policy. They should be focused on common searching innovative solutions and based on mutual benefits.

9.5 National and transnational funding schemes

9.5.1 Funding schemes and possibilities for research funding

	R&I funding options collated for country:	Poland	(Fill out your country name in this box)	

	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
Regional				
1	Public-private partnership	Public-private partnership	case specific / depending on topic / parties involved	www.uzp.gov.pl
2	Voivodship Fund for Environmental Protection and Water Economy	Voivodship Fund for Environmental Protection and Water Economy in each voivodship	according to priorities defined for each year	www.wfosigw.pl
National				
1	Applied research of research institutes	Most of this research is financed by the National Centre for Research and Development (public money)	Research insitutes Back bone for knowledge development: needed to maintain knowledge base	http://www.ncbir.pl/
2	Basic and applied research	Subsidies for R & D programmes of national importance commissioned by enterprises, state administrative bodies or local authorities. The financial means are allocated for the implementation of projects and the utilization of research findings	Research and scientific units/ institutes, universities	http://www.nauka.gov.pl/
3	Money related to national tasks	The ministries have their own obligations (Ministry of Agriculture and Rural Development - Common Agricultural Policy, monitoring of soils etc.)	case specific / depending on topic	http://www.minrol.gov.pl/

4	Research supporting national environmental obligations	The National Fund for Environmental Protection and Water Management provides financial support mostly for projects which implement environmental obligations of Poland transpiring from the membership in the European Union. It also supports the Minister of Environment in meeting Polish obligations under inter alia: the Climate Convention, the Convention on Biodiversity, the NATURA 2000 Programme	case specific / depending on topic	www.nfosigw.gov.pl
5	R&D activities by clusters	public funds coordinated by Polish Agency for Enterprise Development	The development of key clusters is implemented with the support directed to cluster actors, i.e. enterprises and business support institutions such as universities, research institutes, schools, specialized business support institutions etc.;	http://www.pi.gov.pl/ http://www.parp.gov.pl/
6	Fundamental research of universities	Most of this research is financed by National Science Centre (public money) 10 types of funding schemes	Universities. Back bone for knowledge development: needed to maintain knowledge base	www.ncn.gov.pl

European				
1	Horizon 2020 (and before EU Framework Programmes).	EU and private investments	EU Research and Innovation programme (2014 to 2020). Open for consortia, with different parties on different topics (eg societal challenges)	https://ec.europa.eu/programmes/horizon2020/
2	JPI - Joint Programming Initiatives	Member States commit to Joint Programming Initiatives (JPIs)	open for consortia of the contributing member states	http://ec.europa.eu/research/era/joint-programming_en.html
3	Interreg	financed by the European Regional Development Fund	helps regions of Europe share knowledge and transfer experience to improve regional policy	http://www.interreg4c.eu/
4	ERANET - European Research Area Network	instrument under Horizon 2020	instrument to support public-public partnerships in their preparation, establishment of networking structures, design, implementation and coordination of joint activities as well as topping up of single joint calls and of actions of a transnational nature	http://ec.europa.eu/research/era/era-net-in-horizon-2020_en.html
5	LIFE +	instrument under Horizon 2021	EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU	http://ec.europa.eu/environment/life/
6	European structural funds	EU	Structural Funds play a substantial role to help all regions build research and innovation capacities corresponding to their situation and priorities.	http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=structural_funds

7	Revolving funds	different funds. Examples: 1* some European structural funds, e.g. JESSICA (Joint European Support for Sustainable Investment in City Areas)	Labeled money. The investment should give revenues. The difference with an investment fund is that it should serve a public goal.	1* http://ec.europa.eu/regional_policy/index.cfm/en/funding/special-support-instruments/jessica/
8	European subsidies	Eu	Eg. for agricultural sector, European rural development programs	
International				

* Include full name and (if available) acronym of the R&I funding option

** Include name of the R&I funder/funding institute or authority

*** Detail which type of programme, projects, partners or infrastructures they are funding

**** Include weblink and/or other reference for more information on this R&I funding option

9.5.2 Gaps in financial resources for research

There used to be a system of national programs concerning selected thematic blocks most important for the national economy and development. It has been expressed that there is a need for continuation of such a system, but now it is difficult to indicate who could initiate it.

National Fund for Environmental Protection and Water Management declares supporting various research initiatives. Now there are organized national meetings devoted to selected fields of environmental research, which can be a kind of platform for exchanging ideas of further research agenda.

There is a wide research area that is not covered by any funding mechanisms – economic aspects in ecological projects.

There is also a need for wider approach to revitalization in Poland. It is still a problem although many areas have been already rehabilitated but at the same time the so far results show weak points in the process. The conclusions are presenting a wrong approach to the whole process. The social and economic aspects have to be involved in the revitalization process. Before starting with rehabilitation/revitalization projects the economy of a municipality/town/city has to be strengthened. First the city has to have a concept of its development and people need to have a stable economic situation. Then the ideas and demand for regenerated sites can show up. Revitalization process should be an effect of a social and economic development, because not before it this demand for locations for service and production can appear.

9.6 Other remarks made by interviewees

New paradigm of planning of land use. According to opinions of professionals there is a need for new land use planning approach. Nowadays this instrument has lost its significance in new conditions of market play, when investors very often dictate their requirements threatening that otherwise they will choose another partner and another city. Land use planning should refer to the achievements of other fields such as knowledge on soils, water and their role in urban areas. But the message should be sent in a way which would show the consequences of decisions to the health and conditions of life of the inhabitants.

To this end education and communication is necessary from children in primary schools till adults who are voters.

But first land use planners should be convinced to their role which they can and should play addressing questions to other scientists and professionals.

Integration of various professionals in necessary in form of platforms or committees where they could build and then apply this new paradigm.

If **dangerous substances** are identified in a brownfield ground or an object located on it, there is a problem of **profitability of remediation activities** which bring costs prevailing benefits resulting from re-use of an area after remediation. There is no mechanism which would make an investor cover costs of pollution removal. In most cases investors give up if it is a condition of using the area.

In a conclusion it should be stated that brownfields remediation constitutes a barrier for re-using these areas. There is a lack of efficient mechanism of financing activities aiming at rehabilitation of these areas which cannot be re-used in the present state.

It should be stressed that if remediation is to be an own task of a municipality, it is a wrong solution as local municipality has no means to cover high costs of remediation. Such tasks should be finances by other sources.

Acidification constitutes a basic factor of soil degradation in Poland. The scale of this phenomenon is the highest in Europe. It takes place despite multi-year practice of liming. Acid and very acid soils in Poland cover 60% of all soils used for agriculture. It causes decreasing of efficiency especially in case of using fertilizers. There is no research how in various environmental conditions mitigation of acidification will proceed – what will be liming efficiency. It is well known that acidification is also causing other negative effects not only these connected with agricultural production. There is migration of mineral compounds, e.g. aluminium is migrating to underground water. Therefore these resources especially in northern Poland are seriously threatened, which is causing negative health effects in form of increased number of large intestine cancer cases.

9.7 Annexes

Annex Ia: NKS interviews in Poland

Date of interview	Organisation	Name	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./research inst	SME/consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
24-09-15	Faculty of Architecture, Silesian University of Technology	Zbigniew Kamiński			1		1									1
14-10-15	National Fund for Environment Protection and Water Economy	Jerzy Swatoń	1			1							1			
12-10-15	Society of Polish Town Planners	Maciej Borsa		1				1								1
05-11-15	Polish Ecological Club	Ewa Hajduk		1						1					1	
10-07-15	Industrial and Technological Park EkoPark Ltd	Alina Karnabał		1					1							1
11-06-15	Institute of Soil Science and Plant Cultivation	Bożena Smreczak			1		1						1			
30-06-15	Silesian University - Department of Earth Sciences	Janusz Janeczek			1		1						1			
28-04-15	Institute of Environmental Protection	Barbara Gworek			1		1						1		1	
13-05-15	SGS Ekoprojekt	Tomasz Stuczyński		1	1				1				1			1
18-09-15	Institute for Ecology of Industrial Areas	Marta Pogrzeba			1		1						1	1		
28-09-15	Committee for Spatial Economy and Regional Planning	Krzysztof Gasidło			1		1									1
02-10-15	Land Use Planning Department in the City of Sosnowiec	Barbara Knapik		1		1										1
23-10-15	Marshal's Office Silesian Voivodeship	Robert Orpych		1		1										1
26-10-15	Upper Silesian Fund	Tadeusz Adamski	1						1							1

05-11-15	Company of Przezchlebie Waste Dump Exploitation	Leszek Bartkowiak		1				1								1
05-11-15	National Fund for Environment Protection and Water Economy	Wanda Galikowska-Kopacka	1			1							1			
05-11-15	Silesian University -	Adam Rostański			1		1						1			
			3	7	8	4	7	2	3	1			8	1	2	9

Annex Ib: NKS questionnaire template

Questionnaire template in Polish

A. Informacje dot. wywiadu: **Kraj:** **Nazwisko osoby ankietowanej:** **Instytucja/ pozycja w instytucji:** **W jaki sposób osoba ankietowana chce być cytowana:** **Nazwisko osoby ankietującej ze strony projektu INSPIRATION:** **Data wywiadu:**
B. Preambuła: Wprowadzenie
Głównym celem projektu INSPIRATION jest sformułowanie, skonsultowanie oraz zweryfikowanie z punktu widzenia użytkownika końcowego strategicznej agendy badawczej (SAB) w zakresie gospodarowania przestrzenią, zmian w gospodarowaniu przestrzenią i w i w zarządzaniu systemem gleba-osady-woda (Soil-Sediment-Water – SSW) w świetle obecnych i przyszłych wyzwań społecznych (cywilizacyjnych). *Projekt zmierza do zbudowania modeli wdrażania SAB i przygotowania sieci publicznych i prywatnych instytucji finansujących realizację SAB.* *Wywiad stanowi część serii wywiadów prowadzonych w krajach UE zbierających informacje dotyczące stanu badań dotyczących gospodarowania przestrzenią, zmian w gospodarowaniu przestrzenią i w zarządzaniu systemem gleba-osady-woda jak również ich finansowania a w szczególności poszukiwania potrzeb badawczych oraz przyszłych możliwości ich finansowania.* *W wywiadach koncentrujemy się na wymiarze strategicznym ankietując osoby będące mistrzami w dziedzinie, mającymi szerokie spojrzenie i mogącymi wskazać kierunki w zakresie badań glebowych. Wywiad nie powinien przekroczyć czasu jednej do półtorej godziny.*
Formularz zgody ankietowanego: należy przekazać formularz osobie ankietowanej z prośbą o wypełnienie

C. Informacje dotyczące osoby ankietowanej

1. Obecna rola i zadania związane z badaniami dotyczącymi gleb/terenów?
   Czy jest Pani/Pan osobą pracującą w (możliwa więcej niż jedna odpowiedź):
   - O administracji krajowej/regionalnej/lokalnej,
   - O uniwersytecie/instytucie naukowo-badawczym,
   - O MSP/konsultant,
   - O biznes/przemysł,
   - O NGO,
   - O reprezentant/lider sieci,
   - O Inną, proszę podać:……..

2. Jak długo Pani/Pan działa w tej roli? *[czy pojedynczo, czy w zespole, jaka wielkość zespołu, wykształcenie etc.]*

3. Dziedzina (możliwa więcej niż jedna odpowiedź):
   - O gleba
   - O woda
   - O osady
   - O planowanie miast
   - O projektowanie krajobrazu
   - O zarządzanie przestrzenią
   - O Inne….

4. Czy Pani/Pana organizacja finansuje badania?
   - Tak, proszę określić (jako właściciel programu, incydentalnie, jako finanse publiczne, prywatne)
   - Nie

D. Strategiczna Agenda Badawcza (SAB)

5. Jakie są Pani/Pana preferencje w odniesieniu do SAB? *[Think about time span of research need, state-of-the-art description, stakeholder analysis, issues per country or cross European countries, overview of national agendas, funding opportunities, matchmaking opportunities, ….] [Należy wziąć pod uwagę okres realizacji potrzeb badawczych, obecny stan wiedzy, analizę grup interesariuszy, problemy w skali kraju i w skali wielu krajówe europejskich, przegląd krajowych agend, możliwości finansowania, możliwości łączenia (powiązania),…]*

6. Jakie są Pani/Pana oczekiwania w odniesieniu do SAB? *[To what strategic objectives should it contribute?] [Do których celów strategicznych powinna nawiązywać agenda badawcza?]*

7. Pani/Pana proponowany zakres/ tematyka w SAB? *[Content based: kind of areas, scales, societal challenges, needs, …] [zakres merytoryczny: rodzaje terenów, skala, potrzeby społeczne,…]*

8. Obecne agendy badawcze / programy
[*Ask for available documents, sources or desk-study including the timeline of programming and windows-of-opportunities to influence agendas / programs] [Dostępne dokumenty, źródła lub prace studialne dotyczące programowania i inne okazje mające wpływ na agendy / programy]*

9. Czy prowadzi się ocenę efektów / oddziaływania badań w Polsce?
[*If not: why, and if yes: how and what lessons could be learned for new research programmes? it is impact evaluation of research, not about quality of research. Info is of need for our implementation plan. WP4! What evaluations/studies have been made to measure the quality of land and SSW related research in your country? Try and obtain copies of these studies if you don't already have them. What do you consider to be the most important two or three findings of these evaluations/studies? = follow-up to question 8: existing research agenda's / programs]*

[Jeśli nie: dlaczego a jeśli tak: jak to się odbywa i jakie płyną wnioski dla nowych programów badawczych? Jest to ocena wpływu badań, a nie ich jakości. Wnioski są potrzebne dla planu wdrażania. Jakie przeprowadzono działania/ studia, aby ocenić jakość badań dotyczących terenów oraz systemu GOW w Polsce? Jakie są dwa-trzech najważniejsze wnioski z tej oceny? To jest powiązane z pytaniem 8: istniejące agendy / programy badawcze]

10. Co obecnie znajduje się w krajowej agendzie badawczej w zakresie tej tematyki (zarządzanie terenami/ system GOW)?

11. Jakie zagadnienia mają priorytet? *[należy skorzystać z poniższych pytań i rozumieć zagadnienia praktyki gospodarowania przestrzenią, zmian w gospodarowaniu przestrzenią i w zarządzaniu systemem gleba-osady-woda, która może:*

- *przyczyniać się do bezpieczeństwa żywności;*
- *zapewnić bezpieczne dostawy wody pitnej;*
- *zapewnić dostawy i dystrybucję energii;*
- *obniżyć konsumpcję materiałów i surowców / zasobów;*
- *zapewnić efektywne wykorzystanie zasobów naturalnych;*
- *przyczyniać się do mitygacji i społecznej adaptacji do zmian klimatu;*
- *przyczyniać się do zapewnienia zdrowego środowiska do życia;*
- *zapewnić bezpieczną infrastrukturę]*

[Do każdego z powyższych pytań odnoszą się pytania poniżej:

12. Jak dalece pilne /palące jest to zagadnienie [co się stanie, jeżeli nic nie zostanie zrobione]?
13. Kto odczuje skutki?
14. Kto jest odpowiedzialny?
15. Czy jest to temat zajmujący szczególnie Pani/Pana instytucję / branżę biznesu lub jest to problem całego kraju czy może większej liczby krajów?
16. Jaka jest najważniejsza potrzeba badań dotycząca tego zagadnienia?
    [Gdzie jesteśmy teraz, gdzie chcemy być za x lat proszę wskazać horyzont czasowy]
17. W jaki sposób mogą być wdrażane proponowane zmiany i nowa wiedza?
18. Kto powinien finansować te badania?

E. Relacja Nauka - Praktyka (SPI)

19. Jakie są Pani / Pana doświadczenia w wykorzystaniu wiedzy naukowej do:
    - poprawy sytuacji w biznesie?
    - rozwiązywania problemów społecznych?
    - wspierania wdrażania polityk i/lub zmiany polityk?
    [Co działa dobrze a co należy poprawić?]
20. Z jakich źródeł informacji (naukowej) Pani/Pan korzysta?

    [Gdzie znajduje Pani/Pan informacje, co byłoby potrzebne? Czy korzysta Pani/Pan z Wise-RTD? Z innych websites? Itd.]
21. W jaki sposób sektor nie-naukowy (biznes, zarządzanie, inni interesariusze) jest włączony w kreowanie potrzeb i pytań do nauki?
    [Co działa dobrze a co należy poprawić?]
22. W jaki sposób sektor nie-naukowy (biznes, zarządzanie) jest włączony w realizację nauki?
    [*Co działa dobrze a co należy poprawić? Czy poprzez włączenie w konsorcja naukowo-innowacyjne, włączenie we współtworzenie wiedzy itd.]*
23. Czy Pani/Pan zna, może polecić dokumenty krajowe SPI?

F. Finansowanie

24. Jakie modele finansowania są Pani/Panu znane (z własnej działalności lub z doświadczenia), które mogą być przydatne w skali:

a) Regionalnej?

b) Krajowej?

c) Europejskiej? [np. *H2020, wielostronne takie jak Inicjatywy Wspólnego Programowania - Joint Programming Initiatives*]

d) Międzykontynentalne? [*np. Belmont Forum*]

[For all R&I questions aiming at achieving policy targets in the Land & SSW related system, like e.g. Sustainable Development Goals on soils (to be adopted at UN level in September 2015, existing EU directives such as the Environmental Liability Directive, etc. Considering all Public and Private funding sources. If possible please ask to provide details and give most important references (documents, website) that could be relevant for explaining the answer] [

25. Jak uzyskać pomnożenie zainwestowanego w skali regionalnej/krajowej1 Euro (1 PLN) (biorąc pod uwagę wszystkie źródła finansowania) jako wartości uzyskanej w efekcie nowej wiedzy odpowiadającej na europejskie i krajowe zapotrzebowanie? [*CONSTRUCTIONS that (could) work??? PP, PPI, etc. Just ask for suggestions, ideas, and experiences: as open as possible!*]

26. Lub inaczej: jak uzyskać zwielokrotnienie zainwestowanego 1 Euro (ze źródeł krajowych, regionalnych, lokalnych i prywatnych) w postaci wartości nowej wiedzy odpowiadającej na zapotrzebowanie europejskie i krajowe w dziedzinie badań i innowacji w zakresie terenów oraz systemu GOW?

27. Dobre przykłady współpracy w ustalaniu/wdrażaniu/finansowaniu programów badawczych (finansowanych) w zakresie projektu INSPIRATION?

28. Czy są dziedziny, które obecnie nie znajdują finansowania a które wymagałyby nowych systemów finansowania?

29. Badania zintegrowane (niezbędne w przypadku szczególnych problemów społecznych związanych z systemem GOW oraz zarządzaniem terenami) są trudne do sfinansowania a także rzadko podejmowane przez gremia naukowe. Co byłoby niezbędne, aby ten problem rozwiązać?

30. Jak planować /zarządzać odpowiednimi opcjami finansowania wynikającymi z projektu INSPIRATION – na podstawie poprzednich doświadczeń - tak aby:

    - potrzeby społeczne były zaspokojone?,
    - wiedza wynikająca z realizacji Strategicznej Agendy Badawczej była przyjęta i wykorzystana? oraz
    - wykorzystać doświadczenie “fundatorów”, którzy rzeczywiście pomnożyli zainwestowane w wiedzę pieniądze w skali swoich krajów?

G. Inne (uwagi, sugestie, przykłady):
H. Zakończenie wywiadu
Dziękuję za poświęcenie czasu i uczestniczenie w tym wywiadzie: • Czy chciałaby Pani/Pan być informowana o projekcie INSPIRATION? • Czy może Pani/Pan zasugerować, z kim jeszcze możnaby przeprowadzić ten wywiad? • Czy ma Pani/Pan jakieś pytania wynikające z treści tego wywiadu? [*Być może osoba ankietowana będzie miała życzenie, aby przedstawić jej treść podsumowania wywiadu i/lub wyniki badań. Jeśli tak, to należy poinformować, że nie będziemy przekazywać całych sprawozdań, natomiast możemy udostępnić zestawienie wyników projektu z chwilą ich opracowania. Należy także wspomnieć, że aspekty nie omówione w trakcie wywiadu mogą zostać dosłane do KPK]*

INSPIRATION acknowledges the received funding from the
European Community's HORIZON2020 Framework Programme
under grant agreement no 642372

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

See Chapter 1, Annex II

Annex II: Documents used for the PL desk study

POLCITCLIM Research Project financed by Norway Grants**.** Organizing for Resilience. A Comparative Study on Institutional Capacity, Governance, and Climate Change Adaptation in Poland and Norway

Anna Kalinowska (red.): MIASTO IDEALNE – MIASTO ZRÓWNOWAŻONE Planowanie przestrzenne terenów zurbanizowanych i jego wpływ na ograniczenie skutków zmian klimatu. Uniwersytet Warszawski. Warszawa 2015

Strategiczny plan adaptacji dla sektorów i obszarów wrażliwych na zmiany klimatu do roku 2020 z perspektywą do roku 2030. Ministerstwo Środowiska, Warszawa 2013.

Krajowa Polityka Miejska 2023. Ministerstwo Infrastruktury i Rozwoju. Warszawa 2015.

Maliszewska-Kordybach, B., Smreczak, B., Klimowicz-Pawlas A.: Effects of anthropopressure on the accumulation of polycyclic aromatic hydrocarbons in the upper layer of soils in selected regions of Poland. (in:) Applied Geochemistry 24 (2009) 1918 -1926.

Maliszewska-Kordybach, B., Smreczak, B., Klimowicz-Pawlas A., Terelak, H.: Monitoring of the total kontent of polkycyclic aromatic hydrocarbons (PAHs) In arable soils In Poland. (in:) Chemosphere 73 (2008) 1284-1291.

Smreczak, B. (red): Zagrożenia dla prawidłowego funkcjonowania gleb użytkowanych rolniczo – wybrane zagadnienia. Studia i raporty IUNG-PIB 35(9). Puławy 2013.

Wyniki geochemicznych badań osadów wodnych Polski w latach 2003-2005. Inspekcja Ochrony Środowiska. Biblioteka Monitoringu Środowiska. Warszawa 2006.

Stuczyński, T.: Assessment and modelling of land use change in Europe in the context of soil protection. Monografie i Rozprawy Naukowe, IUNG-PIB, Puławy, z. 19. 1-124, 2007.

Wyzwania dla polskiej polityki przestrzennej. Materiały konferencyjne. Kancelaria Sejmu, Biuro Analiz Sejmowych. Warszawa 2008.

Koncepcja Przestrzennego Zagospodarowania Kraju 2030. Warszawa 2011.

Raport o ekonomicznych stratach i społecznych kosztach niekontrolowanej urbanizacji w Polsce. IGiPZ PAN. Warszawa 2013.

Mordasewicz, J., Osiatyński, J., Regulski, J., Stępień, J., Śleszyński, P., Kowalewski, A.: Raport o ekonomicznych stratach i społecznych kosztach niekontrolowanej urbanizacji w Polsce. Fundacja Rozwoju Demokracji Lokalnej i Instytut Geografii I zagospodarowania przestrzennego PAN. Warszawa. 2013.

Annex IIIa: National workshop – agenda

Polish NKS workshop in Katowice - Agenda 5.11.2015 I day	
12.30	Lunch
13.00	Welcome, introduction to program
13.15	Introduction to the project (Anna Starzewska-Sikorska, Justyna Gorgoń, Marta Pogrzeba)
13.30	Introduction to the workshop: summarizing the results of the interviews & complementary desktop work:
	a. Strategic Research Agenda
	b. Science-Policy Interfacing
	c. Funding options
14.00	I Session: "World Café": 3 tables, 30 minutes per table, enriching, completing and suggestion prioritization:
	a. Strategic Research Agenda
	b. Science-Policy Interfacing
	c. Funding options
15.00	Coffee break
15.30	Plenary presentation of World Cafe outcome, followed by possibility for enriching, completion and suggestions for prioritization:
	a. Strategic Research Agenda
	b. Science-Policy Interfacing
	c. Funding options
16.00	II Session: „World Cafe": priorities, programs, projects
17.30	What next & closure
18.00	Joint diner
6.11.2015 II day	
9.00	Welcome back, goal today, introduction to program
9.15	Synthesizing & finalizing the input for the national report in three parallel groups, groups formed before workshop (selected NKS for each group):
	a. Strategic Research Agenda
	b. Science-Policy Interfacing
	c. Funding options
10.30	Coffee break
11.00	Continuation parallel groups
12.00	Plenary presentation outcome synthesis, followed by final possibility by all for final comments in:
	a. SRA (30 minutes)
	b. SPI (30 minutes)
	c. Funding options (20 minutes)
12.50	Closure & farewell
13.00	Lunch

Annex IIIb: National workshop - list of participants

Polish workshop for National Key Stakeholders
5-6 November 2015, Katowice

List of presence

LP	Name	Institution	Signature Day I	Signature Day II
1.	Tadeusz Adamski	Fundusz Górnośląski		
2.	Leszek Bartkowiak	Zakład Eksploatacji Hałdy Przeczchlebie		
3.	Maciej Borsa	Stowarzyszenie Architektów Polskich		
4.	Tomasz Flodrowski	Ekopark		
5.	Krzysztof Gasidło	Politechnika Śląska, Wydział Architektury		
6.	Wanda Galikowska-Kopacka	NFOŚiGW		
7.	Justyna Gorgoń	IETU		

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Polish workshop for National Key Stakeholders
5-6 November 2015, Katowice

List of presence

LP	Name	Institution	Signature Day I	Signature Day II
8.	Janusz Janeczek	Uniwersytet Śląski		
9.	Zbigniew Kamiński	Politechnika Śląska, Wydział Architektury		
10.	Alina Karnabał	Ekopark		
11.	Barbara Knapik	Urząd Miasta Sosnowiec Wydział Planowania Przestrzennego		
12.	Robert Orpych	Śląski Urząd Marszałkowski		
13.	Marta Pogrzeba	IETU		
14.	Adam Rostański	Uniwersytet Śląski		
15.	Bożena Smreczak	IUNG		

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HORIZON 2020

Inspiration

Polish workshop for National Key Stakeholders
5-6 November 2015, Katowice

List of presence

LP	Name	Institution	Signature Day I	Signature Day II
16.	Anna Starzewska-Sikorska	IETU		
17.	Tomasz Stuczyński	SGS Ekoprojekt		
18.	Jerzy Swatoń	NFOŚiGW		
19.	Karolina Wadowska	Ekopark		

Organisation	Name	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
Faculty of Architecture, Silesian University of Technology	Zbigniew Kamiński			1		1									1
Institute for Ecology of Industrial Areas	Justyna Gorgoń			1		1									1
Society of Polish Town Planners	Maciej Borsa		1				1								1
Industrial and Technological Park EkoPark Ltd	Karolina Wadowska		1					1							1
Institute of Soil Science and Plant Cultivation	Bożena Smreczak			1		1						1			
Silesian University - Department of Earth Sciences	Janusz Janeczek			1		1						1			
SGS Ekoprojekt	Tomasz Stuczyński		1	1				1				1			1
Institute for Ecology of Industrial Areas	Marta Pogrzeba			1		1						1	1		
Committee for Spatial Economy and Regional Planning	Krzysztof Gasidło			1		1									1
Land Use Planning Department in the City of Sosnowiec	Barbara Knapik		1		1										1
Marshal's Office Silesian Voivodeship	Robert Orpych		1		1										1
Industrial and Technological Park EkoPark Ltd	Tomasz Flodrowski		1		1							1			1
Company of Przezchlebie Waste Dump Exploitation	Leszek Bartkowiak		1				1								1
National Fund for Environment Protection and Water Economy	Wanda Galikowska-Kopacka	1			1							1			
Silesian University -	Adam Rostański			1		1						1			
		1	7	8	4	7	2	2				7	1		10

Annex IV: Research landscape on Soil and Land Management in Poland

Research on soil and land management in Poland are included in the framework of activities in a number of ccompetent research organizations: universities, research units. This potential is supported by involvement of Polish research institutes in EU RT&D, Interreg and national programs. Also SME activities in soil technology development and practical application are contributing to the research landscape in this field.

The National RT&D Program is setting the following priorities concerning soil issues:

• Prevention of water erosion and soil degradation and low-cost remediation and soil protection

• Prognosis and extreme nature phenomena (floods, draughts) and interaction with natural ecosystems

• Establishing interactive, pan European database on projects carried out by scientific institutes and coordinated by governmental agencies.

Coordination actions are carried out by the Polish Platform on Environmental Technologies aiming at development of knowledge potential and solutions allowing for increase the level of soil protection and remediation at low social costs. The Polish Platform on Environmental Technologies is promoting the following priority technologies:

• Erosion preventing and agricultural applications of water-sorbing geocomposites

• Phytostabilisation of heavy metals in contaminated sites

• Bioremediation of soils contaminated with organic compounds

• Application of evapotranspiration cover as an isolating barrier for contaminants infiltration

• Use of plants for phytoremediation and as II generation biofuels (Salix viminalis, Miscanthus gigantheus, Helianthus annuus, Brassica juncea etc.)

• Tools for environmental characterisation at contaminated sites (GIS, teledetection, non-invasive technologies, sensors, etc.)

• Organic sorbents for removal of organic contaminants.

The Institute of Soil Science and Plant Cultivation is the largest and the oldest research-development centre in Poland, conducting agricultural studies under the supervision of the Ministry of Agriculture and Rural Development. The broad range of activities comprises crop production, soil science and fertilisation, as well as recognition and protection of agricultural areas against various forms of degradation.

Institute of Agrophysics, Polish Academy of Sciences, Doświadczalna 4, 20-290 Lublin, Poland

Institute of Physical Geography and Environmental Planning,
Adam Mickiewicz University,
Dziegielowa 27, 61-680 Poznan, Poland

Implementation of landscape ecological knowledge in practice

University of Marie Curie Skłodowska (UMCS) in Lublin – Faculty of Earth Sciences and Spatial Management

Soil protection meant as soil fertilization, protection of agricultural areas against various forms of degradation,

In soil policy there is not established cycle systemic management of with precise identification of the problems and remediation

• There are well established soil related legal mechanisms and requirements concerning environment protection including soil, waste management, water protection

• The main focus in soil protection is agricultural production, less as the basis of human life and other organisms

• Soil threats to soil are not recognized sufficiently. Spatial contamination (area) of soils is relatively well understood but information on point (facility sites) contamination is not systemic

• No complex management approaches are defined in the legal acts for soil protection and remediation

The needs

• Enhancing selectivity of remediation techniques used in practice with respect to contamination type and site characteristics

• More cost-efficient use of existing technologies and development of new approaches for specific problems

• Development and implementation of administrative soil management procedures based on knowledge and practical experiences

• Orientation on risk management (environmental, health) in flexible remediation schemes

• Building conditions for uptake of new technologies and elimination of barriers for implementation e.g. public procurement

• Strengthening use of soft tools (organisational) for optimisation of soil protection management in sustainable way on site, local, regional and country level

10. Portugal

Report by Thomas Panagopoulos, Vera Ferreira, Dulce Antunes

10.1 Executive summary

10.1.1 English version

Towards a strategic research agenda (SRA) on soil, land-use and land management in Europe, it was collected relevant national information on research demands, based on stakeholder interviews and a workshop. Contributing to food security and food safety, ensuring secure supplies of sage drinking water and energy, and reducing raw material and resource consumption are the priority societal challenges mentioned during the interviews and workshop. The specific topics (research needs) that should be included in the SRA, according National Key Stakeholders (NKS), were: plans for soil conservation; opportunities of innovative and sustainable agricultural technologies; strategies for minimization and remediation of soil/water pollution; combating desertification; promoting urban green infrastructure; urban planning and redevelopment; impact of agricultural policies; competition between land uses; soil system mapping and monitoring; and resource efficient economy with sustainable supply of raw materials.

Some stakeholders in Portugal revealed to use recent knowledge periodically and fundamentally to support decision making process and land management and planning and to produce innovative new products and methods, being the mainly sources to learn about the scientific papers, conferences, reports and data bases. However, as discussed during the workshop by the majority of stakeholders, the scientific knowledge has been weakly used in practice for example for the formulation of national policies and when applied there is a great period of time between the production of scientific knowledge and its application in policy.

It was highlighted the need to improve the dissemination procedure and was suggested enlarged stakeholder's involvement in the future research projects to increase application of research in practice and face effectively the local needs. Furthermore, stakeholders consider important to facilitate the access to data bases and scientific publications through online platforms, and improve the management and identification of national research projects. Indicators should exist, in addition to publications and public presentations, to access the social impacts namely connections between science, legislation and applications, and their inclusion on the future projects may improve the integrated approaches to be funded. Notwithstanding some funding schemes indicated as opportunities for future research, NKS recommend more strategic partnerships between research institutes and companies and a clear and accessible cost-benefits analysis, to increase the added value of financial resources for doing research.

The societal challenges facing Europe increasingly require research and innovation which integrates different approaches from across research disciplines. These often increase the impact and utility of the research for businesses and other users. Concluding the interviews and national workshop, the NKS consolidated recommendations on the future projects, which should integrate economic, social and environmental aspects, improving the success of the research regarding priorities and topics mentioned, ensuring funding establishments, social acceptance and findings applicability.

10.1.2 Portuguese version

Rumo a uma agenda estratégica de investigação sobre o solo, uso do solo e ordenamento do território na Europa, foi necessário recolher informação nacional relevante sobre questões e necessidades de investigação, com base em entrevistas às partes interessadas (National Key Stakeholders - NKS) e através da realização de um workshop. Este relatório nacional (i.e. INSPIRATION deliverable 2.5) integra os dados e conclusões detalhadas desse workshop e das entrevistas (D2.4) em Portugal.

Contribuir para a segurança alimentar, garantir o fornecimento seguro de água potável e de energia, e reduzir o consumo de matérias-primas e recursos são considerados, pelos NKS, os desafios sociais prioritários. Os tópicos específicos de investigação que devem ser incluídos na agenda estratégica, de acordo com os NKS, são: planos para conservação do solo; oportunidades de tecnologias agrícolas sustentáveis; estratégias de minimização e remediação de poluição do solo/água; combate à desertificação; promoção da infraestrutura verde; planeamento e a requalificação urbana; impacto das políticas agrícolas; a competição entre usos do solo; sistema de mapeamento e monitorização do solo; e economia eficiente dos recursos com fornecimento sustentável de matérias-primas.

Alguns NKS em Portugal revelaram usar o recente conhecimento científico fundamentalmente para apoiar os processos de tomada de decisão, gestão e ordenamento do território, e para produzir novos produtos e métodos inovadores, sendo as principais fontes desse conhecimento os artigos científicos, conferências, relatórios e bases de dados. No entanto, durante o workshop foi discutido, pela maioria, que o conhecimento científico tem ainda sido pouco usado na formulação de políticas nacionais, e mesmo quando aplicado existe um longo período de tempo entre a produção desse conhecimento e sua aplicação na política.

Melhorar a divulgação de resultados e o envolvimento das partes interessadas nos futuros projetos de pesquisa será fundamental para ampliar a sua aplicabilidade prática, face às necessidades locais. Além disso, as partes interessadas consideram importante facilitar o acesso público e por empresas às bases de dados e publicações científicas através de plataformas online, e melhorar a gestão e identificação de projetos de investigação nacionais. Devem existir indicadores, além de publicações e apresentações públicas, para avaliar os impactos sociais nomeadamente as ligações entre a ciência, a legislação e aplicações, e a sua inclusão em futuros projetos pode assim facilitar o financiamento de abordagens integradas. Não obstante de alguns esquemas de financiamento indicados como oportunidades para futuros projetos, os NKS recomendam parcerias estratégicas entre os institutos/centros de investigação e empresas, assim como uma análise de custo-benefício clara e acessível, para aumentar o valor acrescentado dos recursos financeiros para fazer investigação.

Os desafios sociais que enfrentamos exigem cada vez mais a investigação e a inovação, que integra diferentes abordagens e disciplinas, que geralmente aumentam o impacto e a utilidade da investigação para empresas e outros utilizadores. Após as entrevistas e o workshop, os NKS consolidaram recomendações sobre os projetos futuros, que devem integrar aspetos económicos, sociais e ambientais, melhorando o sucesso da investigação sobre as prioridades mencionadas, assegurando o financiamento, aceitação social e a aplicabilidade.

10.2 Methodology followed

This national report (INSPIRATION deliverable 2.5) reports the information collated for Portugal in accordance with INSPIRATION D2.3 “Template for national information collation”.

Conceptual model

The outcomes of the collation of demands for research from industry, end-users and funders are taken up and reviewed following a conceptual model as presentd and described in chapter 1). The main EU-societal-challenges which are expressed in the Horizon 2020 work programmes must be tackled to benefit from the land and SSW system and still to protect the natural capital and resources. Consequently, such challenges should be met on the SRA development process. These challenges inherently straddle disciplinary boundaries and changes in one sector can have undesirable and unexpected consequences in another. Thus, multi-dimensional and intra-disciplinary approaches are crucial on the research process. Therefore, in order to knowledge gaps, research questions are structured along four overarching perspectives of the INSPIRATION conceptual model.

Desk exercise:

The desk-exercise was done since the beginning, complementary to the methods mentioned, and the obtained information can be seen as supportive/underpinning to the information provided by the NKS. Via a desk-exercise NFPs investigated, organised, and summarized information obtained through interviews and workshop. This step was particularly important to identify/verify relevant documents, programmes or agendas suggested by interviewees. Moreover, it was essential to structure research questions according the conceptual model. The suggested base documents are listed at the end of Chapter 1.3.2 and the funding schemes suggested by NKS are summarized in Table 1 in section 10.5.

NKS interviews:

A questionnaire template for interviews of the NKSs by the NFPs was prepared (Annex Id). The template was meant as a guide with sample questions and points of attention for the discussion with the NKSs. The questionnaire aims to obtain the information needed to give a foundation to the SRA at national levels regarding three mainly domains: research & innovation needs; connecting science - policy/practice; national and international funding organisations and schemes. In Portugal, 20 NKS were interviewed. We selected NKS to represent different disciplines and institutional backgrounds including: land-use planners; managers; soil, sediment and water experts; researchers, funders and regulators/policy makers. Details on these NKS are provided in Annex Ia. The interviews were done at the work place of NKS and had a duration of more than one hour and due to this some of NKS asked to keep the questionere for some days to review their answers, enrich it with relevant documentation and send it to the NFP in a later date.

Two-day NKS workshop:

It was organized at national level a 2-day workshop where the collated information (NKS interviews and desk-exercise) was reviewed, synthesized and prioritized by the NKSs, under NFP facilitation. The workshop in Portugal took place at the University of Algarve on 6-7th of November, 2015. More than 20 experts from public and private funding institutions, research organizations, industry, NGO and regulation participated in the workshop. It was invited all previously interviewed NKS and if some NKS could not participate in the workshop others took their place. Details on the workshop participants are provided in Annex Ib.

The 2-day workshop had as intention to bring together all NKS and inform about the project methodology and the output of the interviews, to give an opportunity to review the outcome and to make a prioritization of the topics that were suggested as important in the interviews.

The agenda of the workshop can be seen in Annex Ic. The workshop comprised plenary sessions and three parallel sessions for discussion according the key domains (strategic research agenda topics, science-policy interface and possibilities for funding). NFP and two selected NKS did with brief presentations (10 minutes per topic) summarizing the results of the interviews & complementary desktop work. Afterwards, NFPs facilitated three parallel sessions for discussion according the key domains (strategic research agenda topics, science-policy interface and possibilities for funding). All participants had to rotate in the three groups that were formed during the workshop (with selected NKS for each group, which should include at least one specialist of each key domain). Finally conclusions were drawn up in a plenary session where the results of the three parallel key domain groups were presented and integrated.

The post workshop field trip was an opportunity to see in practice the needs and gaps in research at the Portuguese context. The trip went to the recently flooded city of Albufeira and observed the coastal erosion problems due to climate change and inadequate land planning and soil management that is not acconding to the current societal challenges.

10.3 Research and Innovation (R&I) needs

10.3.1 Societal challenges and needs

When asking the most important societal challenges, the NKS listed the following by priority:

- Contribute to food security and food safety;
- Ensure secure supplies of safe drinking water;
- Secure energy supply and distribution;
- Reduce raw material and resource consumption, Ensure efficient use of natural resources;
- Contribute to climate change mitigation and societal adaptation;
- Contribute to a healthy living environment;
- Ensure secure infrastructure;
- Nature conservation, Land degradation: Achieving Land degradation Neutrality
- Sustainable use of ecosystem services,
- Halting the loss of biodiversity;
- Food supply;
- Land-use efficiency;
- Valorisation of natural recourses.

10.3.2 Topics / research needs to include in the SRA

A synthesis of specific topics indicated by the NKS to include the SRA was the following:

Plans for Soil Conservation; Opportunities of innovative and sustainable agricultural technologies; Strategies for minimization and remediation of soil/water pollution; Combating desertification; Promoting urban green infrastructure; Urban planning and redevelopment; Impact of agricultural policies; Competition between land uses; Soil system mapping and monitoring; Resource efficient economy with sustainable supply of raw materials.

The NKS recommended/cited the following important/relevant documents, agendas or programs that define global orientations on the mentioned research topics:

Lei dos solos, Programa Nacional da Politica de Ordenamento do Território (PNPOT), Soil Framework Directive on EU.

Plano de Ação Nacional de Combate à Desertificação (resolução de ministros 78/2014, DR 248).

Lei dos solos, Programa Nacional da Politica de Ordenamento do Território (PNPOT), Soil Framework Directive on EU. These base documents define global orientations.

A Estratégia Nacional de Desenvolvimento Sustentável" (ENDS 2015); Estratégia de Adaptação da Agricultura e das Florestas às Alterações Climáticas; Programa de Ação Nacional de Combate à Desertificação (PANCD).

Estratégia Nacional de Adaptação às Alterações Climáticas (ENAAC 2020)- http://sniamb.apambiente.pt/infos/geoportaldocs/Consulta_Publica/DOCS_QEPIC/150515_ENAAC_Consulta_Publica.pdf;

The United Nations Convention to Combat Desertification (UNCCD);

De Brogniez D.; C. Ballabio, A. Stevens, R. J. A. Jones, L. Montanarella & B. van Wesemael. 2015. A map of the topsoil organic carbon content of Europe generated by a generalized additive model. European Journal of Soil Science, 66, 121–134.

Carbon sequestration in soils: a challenge for food security and climate action (7 July 2015). International organizations (CGIAR, CCAFS, GRA, Global Soil Partnership, AGMIP, FACCE-JPI, African soil carbon network and networks supports by UNEP)

Our Common Future Under Climate Change (7-10 July 2015). Organizations: INRA, Paris, France, CIRAD, Montpellier, France, IRD, Eco&sols research unit, Montpellier.

IPCC, 2014. Climate Change 2014: Impacts, Adaptation and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge (United Kingdom) and New York (USA), 1131 pp

Lugato E., F. Bampa, P. Panagos, L. Montanarella, A. Jones. 2014. Potential carbon sequestration of European arable soils estimated by modelling a comprehensive set of management practices. Global Change Biology J. Vol. 20 (11) Pag. 3557–3567.

Zdruli P., J. A. J. Robert, L. Montanarella.2014 - Organic Matter in the Soils of Southern Europe. European Soil Bureau Technical Report, EUR 21083 EN

Terraprima - Portuguese Project of Pastures Biodiverse Seeded (for carbon sequestration) is awarded with Energy Globe Award Portugal 2014 among 160 countries candidates in worldwide. UNIDO, UNEP and UNESCO

Guardians of Environment Framework: An Integrated Approach of Strategies for Prevention of Soil Pollution and Rehabilitation of Harmed Territories - WP3 – IDENTIFICATION AND ANALYSIS OF THE CURRENT STATUS Act 3.1 Environmental Risk Management: Existing Situation in the Target Regions - The Case of Soil and Water Pollution. GUARDEN South East Europe Transnational Cooperation Programm. 2013.

Environmental Recovery of Degraded Soils And Desertified By A New Treatment Technology For Land Reconstruction. Project sponsored by European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement nr. 282864.

The state of soil in Europe: A contribution of the JRC to the EEA Environment State and Outlook Report-SOER 2010. 2012. A. Jones, P. Panagos, S. Barcelo, F. Bouraoui, C. Bosco, O. Dewitte, C. Gardi, J. Hervás, R. Hiederer, S. Jaffery, L. Montanarella, V. Penizek, G. Tóter, M. Van Den Eeckhant, M. van Liedekerke, F. Verheijen, Y. Yigini.

ORGANIC AGRICULTURE: A Strategy for Climate Change Adaptation. Antje Kölling, Teresa Elola-Calderón eds., Dossier IFOAM EU Group 2012.

THE EUROPEAN ENVIRONMENT STATE AND OUTLOOK 2010: SOIL. Arwyn Jones (European Commission JRC). EEA e JRC ed., Publications Office of the European Union, 2010. ISBN 978-92-9213-157-9.

Falloon P, Betts R, Climate impacts on European agriculture and water management in the context of adaptation and mitigation—The importance of an integrated approach, Sci Total Environ (2009), doi:10.1016/j.scitotenv.2009.05.002

http://www.fao.org/soils-portal/soil-management/soil-carbon-sequestration/en/

Topics proposed:

PT-1. Plans for Soil Conservation

Sub-Topics: Sustainable land management, soil fertility, soil regeneration, carbon soil sequestration, social awareness.

The European landscapes are changing rapidly due to economic and society pressures, and in many regions soil is persistently being disturbed, compacted, buried or ploughed. Land degradation can result in devastating consequences for the provision of ecosystem services (MEA, 2005). So this research topic was indicated as a high priority question, not only for land-users and managers but also for general human well-being, and future research should be fund by governments.

Research and development efforts need not be limited only to already degraded land. Protecting soil in less degraded areas from depletion due to erosion, and monitoring the impact of new settlement schemes also need consideration. It will be necessary more local and regional research about adequate sustainable plans, practices and integrated strategies (facing local conditions and specific land-uses), to increase organic matter in soils when climate conditions are so favourable to the mineralization, to regenerate soil as well as to increase the carbon soil sequestration. The newly knowledge can be used in pilot projects with dissemination of the results, (practice demonstration, and then results divulgation. Furthermore, this knowledge is fundamental to support the policy making process and subsequently the process of implementation.

The social awareness is also an important question in this topic, since the main reason why land users permit land degradation process is related to societal perceptions. Low level of public awareness of land degradation, is limiting the adoption of sustainable land management (SLM) principles and practices among stakeholder groups. Creating awareness and building up a sense of stewardship are important steps in the challenge of reducing land degradation. It will permit an effective implementation of the “appropriate” knowledge by the relevant stakeholders. Substantial efforts should be directed toward finding economic sustainable measures providing economics behind and approaches for proper incentives would be fundamental.

Specific research questions (following the conceptual model of INSPIRATION):

Demand:

- Identify the economic activities and analyze in what proportions the resource soil can be degraded.
  Why: This is to understand the main degradation drivers.

Natural Capital:

- Assess key indicators of soil quality (chemical, physical, and biological properties) and carbon sequestration potential.
  Why: To better understand state of the soil and the effects and consequences of land management practices.

Land management:

- Define and design sustainable land management approaches to maintain soil fertility and alternatives for soil regeneration, applying some in pilot projects.
  Why: To better understand the efficiency of some alternative land-use practices in protecting and restoring the natural capital of soil.

Net-impacts:

- Improve knowledge about socio-economic and environmental impacts and benefits resulting from different land management strategies;
  Why: Improve the social awareness and acceptance among decision-makers for implementing conservation practices on different land-uses.

PT-2. Opportunities of innovative and sustainable agricultural technologies

Sub-topics: Organic farming opportunity; sustainable agriculture practices; potential productivity of land; waste compost alternatives, water use efficiency in agriculture.

Currently, there is a need to achieve a more sustainable agriculture that feeds society effectively, contributes to rural development and provides subsistence to farmers without damaging the natural resources. Organic farming has been proposed as an important means for achieving these aims. Some sustainability impacts of organic farming are known, however it will be fundamental more research on this sub-topic. It would be fundamental to assess the economic, social and environmental sustainability of such agricultural practices, as well as to identify the problems and benefits. Some constraints to increasing the role of organic farming have been also discussed, but ongoing monitoring and evaluation of market development, production costs and consumer perception is desirable. Research on potential productivity of soils and alternative ways to increase soil fertility (such as green manure or composts), would be necessary. Furthermore it would be crucial more knowledge about water efficiently in the agriculture, namely on integrated management systems to reuse the urban water.

This question affects population in general but the research should be centered on farmers and conducted with and for farmers, identifying and accounting their issues, needs and perceptions. Currently, in Portugal we are at initial phase with a growing concern about these topics, but farmer's actions will depend from economic factors. Scientific knowledge about these innovative technologies (options, challenges and benefits) would be necessary and can be effectively used to incentive and prepare farmers.

Specific research questions (following the conceptual model of INSPIRATION):

Demand/Natural Capital:

- Evaluate the potential productivity of land, which cultures can be successfully adapted to local conditions and waste compost alternatives.
  Why: Fundamental to decide for which agriculture technologies, which composts, and also for water use efficiency.

Land management:

- Identify necessary technology or operation materials to increase the efficiency of agriculture and food security;
- Study and assess impacts of innovative and sustainable agricultural technologies.
  Why: This is fundamental to increase knowledge about economic and technical aspects, and their advantages and disadvantages, useful for farmers and decision-makers. It will provide also knowledge to improve competitiveness and sustainability.

Net-impacts:

- Understanding how organic agriculture can contribute to sustainable food security and if it should become a priority in development policies related to sustainable agriculture and rural development.
  Why: For food security risks and to improve awareness and acceptance among farmers and decision makers.

PT-3. Strategies for minimization and remediation of soil/water pollution.

Soil and water are required resources for life on Earth. In most cases, an impact on the soil system has a direct impact on water resources. For example, the intensification of soil erosion process compromise also reservoir's freshwater quality. Soil and water contamination can results from intensive farming, which relies in many cases not only on the extensive use of fertilizers and pesticides, but also on irrigation. Agriculture, in particular, is a major source of nitrate pollution of inland waters, and it is even observed an increase in deep groundwater. Also the livestock effluents can pollute the environment and it's particularly relevant on the "agro-silvo-pastoral system Montado", a sensible ecosystem.

It will affect water and soil quality as natural capital and ecosystem services. The successful of some economic activities (such as agriculture or tourism) and human well-being depends on healthy soil and water. Fertile soil and clean water are both renewable resources in natural systems and, when managed properly, can also be renewable resources in the context of agricultural production. So, it's a high priority research topic, involving many stakeholders and end users, who could benefit from this research.

Specific research questions (following the conceptual model of INSPIRATION):

Demand:

- Assessing the main pollution sources (activities), the pollution hotspots and new (emerging) pollutants;
  Why: To understand the dimension and trends of the issue.

Natural Capital:

- Identify pollution impacts on natural resources, understanding how it affects the provision of ecosystem services (analysis of ecological, social and economic aspects).
- Understand the pollutants kinetics of transfer in soil and water and spatial and temporal dynamics.
  Why: Fundamental for conscientious decisions and to delineate future strategies for minimizing pollution and technologies for remediation.

Land Management:

- Study and define alternative technologies and practices for soil and water remediation and to minimize pollution, accounting the various sources of elements, and assessing the costs associated.
  Why: to achieve the desired outcomes.
- Identify and evaluate types of environmental policy instrument.
  Why: To ensure the application of such technologies and practices to minimize pollution and respect limits.

PT-4. Combating desertification

Sub-topics: climate change, soil erosion and land degradation.

Desertification has been a recognized environmental problem for decades. Many of desertification's causes are anthropogenic (deforestation, overgrazing, poor irrigation systems, changes in population density), but the problem can also be exacerbated as severe weather events increase due to climate change. Climate change is expected to intensify the forces responsible for soil erosion, increasing the susceptibility of populations and their environments. Persistent reduction of ecosystem services as a result of desertification links land degradation to loss of human well-being. It will cause also rural abandonment and intensification of climate related problems in cities. It's particularly important for some countries, as Portugal, and affects not only farmers but the society in general.

Up to now, there are evidences and scenarios about erosion increasing all over the world, but it would be important to improve the monitoring and evaluation of desertification, land degradation processes and sustainable practices through pilot experiments and demonstration sites. It is important to find solutions not only for restoration but also for adaptation to climate change induced desertification. The effects of desertification on economy and social impacts should be also included. This integrated knowledge can be used by land users and land managers to decide for adequate practices and by land planners to implement effective policies that address the problem of desertification under climate change. This type of research should be founded by governments.

Specific research questions (following the conceptual model of INSPIRATION):

Demand:

- Identify and assess main trends and drivers of desertification.
  Why: To understand the issue dimension in a world that increases by 100 million people per year.

Natural Capital:

- Identify and investigate the desertification effects, analysing economic impacts (e.g. in terms of soil ability to support current and future crops), environment issues (e.g. ecological misbalances) and social impacts (e.g. human health, migration).
  Why: to support the design of adequate land management strategies in order to mitigate or to adapt to the climate change impacts.

Land management:

- Delineate and assess climate change mitigation and adaptation strategies for land management, using pilot projects;
- Developing information and monitoring system;
  Why: To combat land resource degradation, ensuring its natural capital and ecosystem services.

Net impacts:

- Interpretation of research results, so they are in context and understood by decision makers, resource users and people focused on economic development,
  Why: Essential step towards enhancing understanding based on research.

PT-5. Promoting urban green infrastructure

Sub-topics: grass management; urban agriculture; green-roofs.

The “green infrastructure” in urban landscapes (such as green roof and walls, parks, tree plantations, urban farming areas, etc.,) is a recognized instrument for increasing resilience of cities, and can help in adapting to the main current and future challenges of development, climate change and biodiversity loss, ensuring food security, fresh water and well-being. Green infrastructure can provide several environmental, economic and social values and services to urban communities. The management of land resources for green infrastructure has to follow integrated and cross-sectoral concepts in order to answer the different demands of natural capital. Its multi-functionality involves the interest of a variety of stakeholders, such as private business (e.g. tourism sector), planning authorities, conservationists and public.

Thus, benefits, costs or opportunities for green infrastructure, as well as adaptation strategies to climate change should be assessed. Research about green infrastructure can contribute to the communication of its potential and its successful implementation in urban and regional plans. Research on ecosystem assessment and the trade-offs between ecosystem services would be essential, taking into account conflicts of interest between various land uses and green infrastructures. Research will require an interdisciplinary approach. Local authorities, companies and universities should be responsible for founding research in this topic.

Specific research questions (following the conceptual model of INSPIRATION):

Demand:

- Integrate green-infrastructure in spatial planning, identifying and mapping green infrastructure elements and requirements/opportunities.
  Why: To understand the current state of green infrastructure and to estimate its value under different scenarios.

Land management:

- Develop green infrastructures for climate change adaptation and well-being. Economic evaluation and environmental justice;
- Pilot implementation and monitoring of green infrastructures;
  Why: To ensure its success, contributing to dissemination of its potential.

Net-impacts:

- Improve knowledge about potential socio-economic and ecological benefits (town’s resilience, carbon sequestration, or provision of ecosystem services e.g. food production, water regulation, recreation, thermal comfort, health).
- strengthening the participation of a wider range of stakeholders in decision-making processes with implications for green infrastructure;
  Why: raising awareness and acceptance among decision makers in policy, and to target relevant stakeholders and the general public. To support future political and decision making process.

PT-6. Urban planning and redevelopment

Sub-topics: Brownfields redevelopment; multicultural cities; Ageing; Shrinking cities.

Land is a limited natural resource. The efficient urban planning is one of the priorities on the EU countries facing the intensification of urban growth and sprawl. Currently the absence of a strong policy in Portugal that reinforces land reuse has consequence in a society that keeps on consuming green areas and fertile soils to feed urban development. Brownfields in shrinking cities could be reused converting problem in opportunity. This urban sprawl means significant losses in land supply that means a wasteful of its natural capital or services in a long-term perspective. It was demonstrated that the conversion of productive farmland with fertile soil into urbanized areas, may lead to inefficient land allocation. Sustainable urban land-use concerns everyone since it has significance to the human well-being, economic development and environment protection.

Therefore, how to provide effective support to the planning process in these cities is a necessary research question. Socio-economic, political and environmental evaluation, the possible indicators, development of databases (e.g. of brownfield areas) and spatial analysis are some of the priorities. It is also necessary to create more and recent cartography to use it in land management, planning and projecting the future change and development. This priority research question should be funded not only by the government who grants permissions to urban and industrial development, but also by private sector like urban contractors, industrial companies, and corporations, which will, on a near future, be part of this problem.

Specific research questions (following the conceptual model of INSPIRATION):

Demand and natural capital:

- Analysis of shrinking cities and alternative development. Identification of brownfields, redevelopment areas and priority areas for requalification and greenfields.
  Why: Essential knowledge for sustainable urban planning, with current mapping and scenarios for future development taking into consideration demographic and environmental trends.

Land management:

- Improve research focused on technical, structural and innovative solutions, instruments and policies for redevelopment and urban requalification. Planning for multicultural cities.
  Why: to improve not only the development and urban planning efficiency with economic and environmental benefits but also to ensure the well-being of city residents.

Net impacts:

- Gain knowledge on the impacts of different management strategies and deal with synergies and trade-offs between multiple land functions.
  Why: Raising awareness and acceptance among stakeholders is crucial for supporting decisions/policies to reduce land uptake.

PT-7. Impact of agricultural policies

Sub-topics: Environmental effects; socio-economic transformations; rural development.

The general trend towards more intensive agriculture in Europe has a profound impact on the environment, including emissions to air and water, quality and quantity of surface water and groundwater, soil erosion, pollution due to large-scale use of pesticides, and loss of biodiversity and habitats. Thus, improving the environmental performance of agriculture is high priority on the EU countries. However, there is a lack of research on the effects of agriculture policies (such as EU's Common Agricultural Policy) on the environment, on rural development and on socio-economic changes.

Thus, long-term assessment of policy effects and efficiency should be investigated. Future scenarios can be used as tools for analyzing how driving forces in the field of agriculture can influence e.g. biodiversity and other key ecosystem services. These long-term effects of agricultural policies and the newly gained knowledge can be applied on models. The models should incorporate the environmental, social and economic aspects of benefits and costs of the policies. This research could provide data and validated tools for optimizing agricultural policy in the European Union, helping in the planning and implementation and accounting specific issues in a particular country (such as socio-economic conditions). This research is important especially for farmers, regarding rural development and also sustainability.

Specific research questions (following the conceptual model of INSPIRATION):

Demand:

- Analyze the main driving forces and environmental, social and economic aspects influenced by agricultural policies;
  Why: To gain knowledge to develop models that can better guide policy makers in the formulation of new agricultural policies.

Land management:

- Develop models incorporating the environmental, social and economic aspects to guide policy-making process
- Create a monitoring system to analyze the implementation of new agricultural policies;
  Why: To ensure the success and efficiency of these agricultural policies.

Net-impacts:

- Interpret the benefits of this research process on the agricultural policy formulation and evaluate the costs associated with non-efficient policies.
  Why: To ensure the application of new knowledge obtain through scientific research on the future policy development.

PT-8. Competition between land uses

Sub-topics: land-use efficiency; bioenergy demand

Competition for land is increasing as demand for multiple land uses and ecosystem services grows. A growing quest for bioenergy for climate change mitigation, exacerbates this competition for land in Europe. This is happening in parallel with other growing demands from land systems for urbanization and comfort, and other ecosystem services such as food production, water resources and biodiversity. Inappropriate policy decisions on different levels could have profound effects, intensifying competition for land. Increased competition may stimulate efficiency but negative effects are likely in the absence of appropriate regulations. Some possible negative effects of increased competition for land include pressures on biodiversity, rising food prices and GHG emissions. Thus, potentially negative environmental and socioeconomic aspects of land-use competition deserve more research. Analyses and planning at the landscape level might be increasingly important to minimize and balance the trade-offs that arise from land-use competitions as well as maximize the synergies around land uses and ecosystem services. The land-use efficiency is one of the priorities on the EU countries, and governments need to ensure the efficient supply of multiple ecosystem services from land system.

Specific research questions (following the conceptual model of INSPIRATION):

Demand/Natural Capital:

- Identify the land functions that are being competed, understand to what extent they are exclusive or might be reconciled and identify the competing actors and through what socioeconomic mechanisms.
- Understand the main political drivers that lead to conflicts of interests.
  Why: Essential for future strategies to conflict management.

Land management:

- Delineate and plan political and economic approaches.
  Why: to resolve land-use conflits and minimise impact on society, ecosystem services.

Net-impacts:

- Identify the impacts of land competition on environment, economy and society (e.g. on loss of biodiversity, on food provision)
  Why: To improve consciousness among policy makers for policies efficiency to minimize land conflict.

PT-9. Soil system mapping and monitoring

Compared with air and water, soil has received little attention in terms of monitoring. There are some instruments for land decision-makers but it is necessary consolidate them and give some coherency. Firstly it will be necessary to improve the data bases/platforms about this resource in Portugal, as it exists for United States (Ex: USDA), and to be acquainted with the soil state-of-art at all levels (e.g. soil properties, soil classification, practices that are being implemented, how soil quality is changing, etc). Besides, the knowledge should be spatially structured. This demand of this soil knowledge is driven by the need to underpin sustainable land management and policy making process. Furthermore it would be necessary to support specific studies concerning the protection of soil-sediment-water system. This platform can be used by general public, scientists and soil resource users, planners and decision-makers.

Specific research questions (following the conceptual model of INSPIRATION):

Demand:

- Identify the existing databases, lack of information on different levels, and needs for information update.
  Why: To understand the existing soil data that need consolidation, and to prioritise data investigation and monitoring needs.

Natural capital:

- Develop new, feasible data acquisition methods using drones and satellites for digital soil mapping;
- Monitoring and mapping of essential and missing information (basis) about the soil resource;
  Why: To integrate useful information basis for public, researchers, stakeholders and different decision makers.

Land management:

- Develop online platforms to share the existing and future mapping and monitoring knowledge.
  Why: To optimize the delivery and utility of soil data, for new research, to support land management process and the policy formulation, and also promoting public awareness,

PT-10. Resource Efficient Economy with a Sustainable Supply of Raw Materials

Sub-topics: Multifunctional forest; Mediterranean landscape; non-wood forest products

Mediterranean ecosystems provide a wide array benefits and economic values, such as non-wood forest products and biodiversity welfares, being a source of energy, water, food, tourism and many other goods and services. For example non-wood forest products (such as cork, aromatic plants, mushrooms, etc.) can be fundamental for rural development with high potential for local economies. The benefits from this goods and services are spread a wide variety of stakeholders in both private and public sphere. However, for the protection of this natural capital, economic and environmental systems and human well-being can no longer be kept apart in the SSW management process. So, to ensure the resource efficient economy with a sustainable supply of raw materials, future research should provide useful knowledge for policy makers and forest land managers, about valuation and marketing of environmental goods and services, adaptation to climate change, biodiversity conservation, combating desertification, and wildfire prevention. Understanding the distribution of costs and benefits is also important when considering how to mobilize funds for conservation.

Specific research questions (following the conceptual model of INSPIRATION):

Demand:

- Recognize the main drivers regarding SSW management and consequences of inefficient resource use.
  Why: To raise the awareness about the importance of protecting natural capital and ecosystem services.

Natural capital:

- Identify valuable goods and services of Mediterranean ecosystems and the potential markets.
  Why: To understand the economy potential for sustainable rural development and competiveness.

Land management

- Creating, modelling and visualizing scenarios for the emergence of resource-efficient economies, through linking quantitative economic and ecological models. It will be essential to study also strategies for adapting climate change.
- Identify and evaluate the existing policies and economic instruments;
  Why: It is fundamental to provide indicators for future decisions.

Net-impacts

- Interpretation of the results, so they are in context and understood by decision and policy makers.
  Why: fundamental to support future decision-making and policy formulation on SSW systems, ensuring the efficient and sustainable supply of ecosystem goods and services.

10.4 Experiences regarding connecting science to policy/practice

10.4.1 Use of knowledge

"Scientific knowledge" was essentially described as the acquired new knowledge obtained through scientific methods, including practice, experimentation and validation, to achieve specific objectives.

NKS revealed to use newly/recent knowledge regularly and fundamentally to support decision making process and land management and planning, to produce innovative new products and methods, and also, on the academic field, for dissemination through writing papers and teaching.

The mainly sources to learn about are the scientific papers (about 93% of interviewees), conferences (about 80% of interviewees), reports (about 67% of interviewees) and data bases (about 60% of interviewee). Television and newspapers are the lowest mentioned.

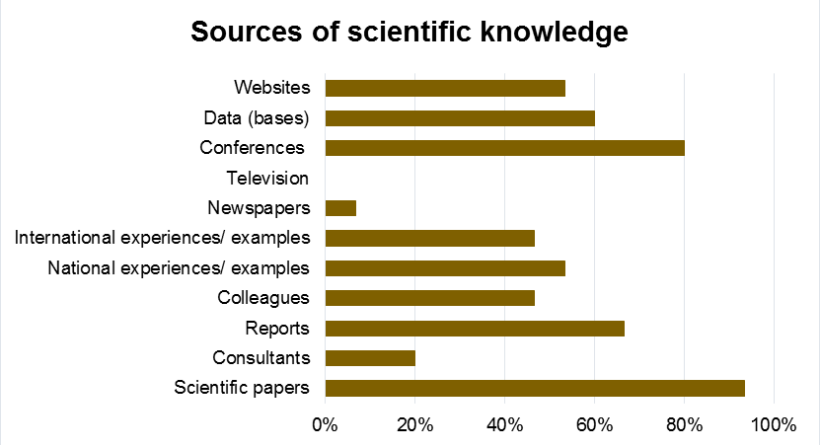


Figure – Percentage weight of answers from NKS in Portugal to question: Which sources of (scientific) knowledge do you use for doing your job?

10.4.2 Possibilities to set the agenda

Several NKS, essentially linked to academia, believe that their influence on setting scientific research policies/agendas is very low, since these reflect only partially their necessities and priorities. Though, some stakeholders assume that they can contribute to update information being used on policies formulation, through official feedbacks or reports, conferences, commissions and collaboration with responsible. They discussed that the national policies/agendas reflect more the priorities in general and not always the needs for each sector.

Interviewees indicated that it is not in detail known to what extend has been made use of the state-of-the-art in scientific research for the formulation of existing policies. Some NKS discussed that national policies/agendas reflect only slightly the priorities and needs, revealing that state-of-the-art in scientific research were weakly used for national policies formulation, since the recommendations are from the European Commission. They also argue that some policies are influenced by lobbing and interests of specific important groups. Others believe that while some policies depends from the global research, there is a great period of time between the production of scientific knowledge and its application in policy.

10.4.3 Science – policy – practice

Depending on his position and sector, NKS were involved on the formulation of research questions, or on doing scientific research, or synthetizing it for policies and decisions. Many of stakeholders from entities or authorities don't contribute or collaborate with scientific research but reveal to synthetize knowledge for policies, decisions or business opportunities. On the other hand, stakeholders from universities and research institutes are more involved in doing scientific research and formulating investigation questions.

Most of NKS consider that was very successful/satisfying their involvement on these processes namely in achieving research objectives, innovation and execution. Some stakeholders mentioned the asset to decide and to plan based on real information.

Nevertheless, some suggestions were done so that the obtained knowledge, from future scientific research, can be useful in practice and known in the wider society, namely:

- Improve the results dissemination;
- Include the involvement/collaboration with the stakeholders/entities in the future research projects,;
- Facilitate the access to data bases and scientific publications through online platforms;
- Improve the management and identification of national research projects through a platform;
- Monitoring the practical application of policies and actions;
- Valorize human resources;
- Improve connections between regional entities.

Institutional barriers, conflicts of interest, gap between research and society, unclear investigation objectives, bureaucracies and the thematic concentration should be avoided.

The societal impact of scientific research is considered indirectly and it was mentioned as satisfying from few NKS to inexistent or of unknown impact from most NKS. The scientific publications and public presentations were mentioned as the main indicators used on project evaluation, which was considered as a negative aspect. Other indicators can be used to evaluate also the social impact of projects, namely connections between science, legislation and applications. An example is information collection about management land practices applied (which ones, and who), as a result of research projects.

As improvements also can be the public participation through conferences and with the stakeholder's involvement in the research since the beginning of the project (specially the private stakeholders), promoting the proximity between the research and practice and avoiding the deviation between investigation and societal needs.

From some NKS it was mentioned that it should be allowed the creation of work groups and business opportunities and that it should be avoided the research/policy not applicable to local necessities and practice.

According to the NKS the following official-papers can be considered Science-Policy-interface documents since they incorporate science and policy aspects:

- Legislation / legal and regulatory framework on specific research topics;
- Policies and official plans for land management, examples:
  - Planos Diretores Municipais (PDM);
  - Programas Regionais de Ordenamento do Território (PROT);
  - Programa Nacional da Política de Ordenamento do Território (PNPOT);
- Action plans and strategies/programs, examples:
  - Estratégia de investigação e inovação para uma especialização eficiente 2014-2020 (ENEI), https://www.portugal2020.pt/Portal2020/Media/Default/Docs/EstrategiasEInteligente/ENEI_Vers%C3%A3o%20final.pdf;
  - Programa de acção nacional de combate à desertificação, http://www.icnf.pt/portal/naturaclas/ei/unccd-PT/pancd/programa-de-acao-nacional-de-combate-a-desertificacao-pancd;
  - Estratégia do Ministério da Agricultura e do Mar para a Investigação e Inovação Agroalimentar e Florestal no Período de 2014-2020, http://www.iniav.pt/fotos/editor2/estrategia_mam_livro.pdf;
  - Estratégia Nacional para as Florestas (2014), http://www.icnf.pt/portal/icnf/docref/resource/doc/docref/enf-auscultacao;
- Environmental impact statements and monitoring plans;
- Documents / regulations of the funding institutions and programs, examples:
  - Regulations for Environmental funds, http://www.apambiente.pt/index.php?ref=17&subref=162 / http://www.icnf.pt/portal/fundos;
  - Regulations for funding grants, projects and scientific research institutions and other scientific policy documents, www.fct.pt.

10.5 National and transnational funding schemes

10.5.1 Funding schemes and possibilities for research funding

The following table presents some regional, national, European and international funding schemes that interviewees believe could offer opportunities for research on the themes considered in the INSPIRATION project.

Name*		Research and Innovation funder	What and/or whom do they fund?	More info
Regional				
1	Public entities	Examples: CCDR (Comissão de Coordenação e Desenvolvimento Regional); Municipalities.	Different regional, economic, social and institutional authorities. They fund different regional projects, facilitating entities to work together on regional issues.	http://webb.ccdr-a.gov.pt/
2	Private entities	Example: EDIA (Empresa de Desenvolvimento e Infra-estruturas do Alqueva, S.A).	Depending on topic/ entities involved	http://www.edia.pt/pt/
3	Regional institutes and labs	Example: CEBAL (Centro de Biotecnologia Agrícola e Agro-Alimentar do Alentejo)	They more facilitate different entities to work together and fund projects.	http://www.cebal.pt/
4	Public-private collaborations	Public and private entities	Many entities have some budget and the same questions	
5	Polis	Private and Public funds and EU funds.	Program closed. It fund urban requalification and environmental valorisation projects	http://www.dgterritorio.pt/a_dgt/outras_estruturas/programa_polis/
6	Operational Regional Programs	Programs under Portugal2020. Public and EU funds.	Projects with specific priorities e.g. enterprise competitiveness and internationalization, sustainability development, environment, innovation and investigation.	https://www.portugal2020.pt/Portal2020/programas-operacionais-portugal-2020-2

National				
1	FCT (Fundação para a Ciência e a Tecnologia)	FCT's budget encompasses funds from the Portuguese state budget and European structural funds.	Supports the scientific community in Portugal, namely individual scientists, research teams or R&D centres. It includes various topics.	http://www.fct.pt/index.phtml.en
2	Portugal 2020	EU and public funds. Several national programs as funding opportunities. Example: POSEUR: Operational Programme for Sustainability and Efficient Use of Resources.	Depending on topic or project.	https://www.portugal2020.pt/Portal2020/programas-operacionais-portugal-2020-2
3	PDR2020	EU and public funds. It's a program under Portugal 2020. Before ProDer (finished).	Supports rural development projects (agriculture, forests, sustainability and innovation are some priorities)	http://www.pdr-2020.pt/
4	Vales I&D	EU and public funds. Instrument under Portugal 2020.	Small to medium enterprises in different topics.	http://www.conclusao.pt/vales/vales-inovacao-e-idt/
5	Green Project Awards Portugal	Collaboration between APA (pubic institute), GCI (public engagement consultancy) and Quercus (NGO).	For enterprises, NGO's, educational institutes, local and public authorities and individual citizens. Topics: agriculture; sea and tourism; research and innovation; products and services; mobilization; youth initiative; efficient resource management; and sustainability.	http://gpa.pt/
6	Public or Private research labs and institutes	Public or Private funds. Example: INIAV (Instituto Nacional de Investigação Agrária e Veterinária, I. P.)	Fund or collaborate with research projects.	http://www.iniav.pt/

7	QREN (Quadro de Referência Estratégica Nacional)	EU funds	Projects in several topics.	http://www.qren.pt/np4/home
8	Fundação Calouste Gulbenkian		Provides funding to individual scientists through grants or projects.	http://www.gulbenkian.pt/Institucional/pt/Apoios/BolsasGulbenkian?a=1844
9	Environmental funds	Government	Supports sustainability projects for public or private entities. Examples: Carbon fund, Water resource fund, Nature conservation and biodiversity fund.	http://www.apambiente.pt/index.php?ref=17&subref=162&sub2ref=483 http://www.icnf.pt/portal/fundos
European				
1	Horizon 2020 (and before EU Framework Programmes).	EU and private investments	EU Research and Innovation programme (2014 to 2020). Open for consortia, with different parties on different topics (eg societal challenges).	https://ec.europa.eu/programmes/horizon2020/
2	Interreg	Financed by the European Regional Development Fund. Examples: Interreg Sudoe; Interreg España-Portugal.	Helps regions of Europe share knowledge and transfer experience to improve regional policy	http://www.interreg4c.eu/
3	LIFE +	Instrument under Horizon 2021	EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU	http://ec.europa.eu/environment/life/
4	Revolving funds	Different funds. Examples: 1* some european structural funds, eg JESSICA (Joint European Support for Sustainable Investment in City Areas)	Labelled money. The investment should give revenues. The difference with an investment fund is that it should serve a public goal.	http://ec.europa.eu/regional_policy/index.cfm/en/funding/special-support-instruments/jessica/

International				
1	Fundação Luso-Americana para o Desenvolvimento (FLAD)		Supports scientific community (individual or teams) or public/private entities depending on specific program/grants	http://www.flad.pt/
2	Aga Khan Foundation (AKF)		It provides scholarships for post-graduate studies and helps in creating opportunities and partnerships to support research projects. Different topics including rural development and environment.	http://www.akdn.org/akf.asp

When asking about how to increase the added value of financial resources for doing research that contributes to national and EU demands, its mentioned the “Plataforma do Golf” as an example about linkage between Golf enterprises and university research to achieve this multiplier. It was also suggested active participation of farmers and other private stakeholders on the projects with innovative practices and knowledge on new markets.

A cost-benefit analysis is important. Inclusion of societal impact indicators can improve the integrated approaches to be fund and get recognized. Besides that NKS suggested regional funding options to ensure the inclusion of local social necessities and the definition of specific objectives according the specificities of economies. Stakeholder’s intervention should be improved with projects transparency.

Demonstration fields were suggested as important way to increase the added value of financial resources for doing research that contributes to national and EU demands, and should be covered by new funding schemes. Experimental and demonstrating centers should be covered by international funding mechanisms. It’s relevant the creation of a dissemination platform that includes results of existing ongoing projects. It could help to avoid the funding on already studied aspects. The connection between institutions should be improved and the information should be available (avoiding the payment to get it).

It was also discussed the necessity of changing mentalities on private sector to understand the benefits or research, and that the research sector should demonstrate properly these benefits.

PPP could be a very useful instrument. Although in the past some formed schemes didn’t work well, so it’s important to improve the cooperation. Still, state and privates need to understand that a PPP should be a win-win commitment, and not a way to enrich few national companies and corporations.

10.5.2 Gaps in financial resources for research

Concluding the interviews, the NKS consolidated recommendations on the future projects, which should ensure the linkage between research institutes and companies, and should comprise costs evaluation, related to environmental impacts. There are areas of environmental research and innovation that are not priority yet. The climate change as a problem in Portugal was not covered by the funding schemes, because usually it’s investigated in an international approach. The brownfield redevelopment is indicated as an area not covered by current funding schemes. The ecosystems and the adaptive mechanisms should be included in current funding, according the some NKS. The turfgrass management was indicated as an area not covered by current funding schemes yet. The landscape architecture subjects also lack of funding schemes.

Some NKS consider the current funding options successful, because usually promotes the creation of networks for continuation of research, however, it’s fundamental the networks divulgation and to avoid problems with excessive partners. Some other NKS considers the funding options unsuccessful, because usually the results of research study don’t have influence on national policies, and this is happening because of insufficient diffusion. Some

aspects that should be included regarding the funding options are: performance targets, priority themes and validation of the results. The practice component should be required. However, the scientific information should be simplified and adequate for dissemination with the stakeholders.

The best solution for funding societal demands of the SRA, is to ensure the integration of different components on the projects as economic, social, environment and research fields. It will permit to gain knowledge in different areas and understanding different benefits. NKS discussed that all the components should have the same weight, avoiding some areas to be predominant and recommend funding calls for multidisciplinary topics.

NKS think that to avoid the difficulty to fund and to recognize the integrated approaches related to land use and management and SSW systems through integrated approaches, it's necessary the definition of target sectors for research funding, that represent a line and mechanism with not only social and economic objectives but also concerning ecosystem sustainability (e.g. research in Wine). NKS considers that the definition of guidelines for integrated approaches would be necessary since these are usually difficult to fund and get recognized.

Research results should be more visible and the finding of projects should be emphasized near local and regional communities so that people can understand that research funding money is necessary for the country development and sustainability. On the last 40 years there was an evolution on the environment policies, however it's necessary to develop the population culture and awareness in environmental questions, as for example I happen with the "recycling", since the citizens have to percept benefits to change their behavior. An example is the relation between public health and pollution.

It will be fundamental, the results demonstration and divulgation, including cost outcomes assessment, so that integrated approach get recognized. Stakeholder's involvement will be a strategic way for integrated approaches on soil resource management, including different socio-economic components, and the partnerships can be an effective solution.

A mechanism to demonstrate the relevance of the study, including marketing of the results, it's considered important to get fund and recognized by the research funding communities.

Research funding communities should require multidisciplinary and projects with socio-economic and environmental benefits, avoiding the funding on project without applicability.

10.6 Other remarks made by interviewees

The European Commission allocated 31.7 billion of euros to fund the research and innovation in the great societal challenges, such as: health and wellbeing, demographic changes, food security and safety; sustainable agriculture; marine research and bio-economy; safe, clean and efficient energy; intelligent, eco and integrated transports; climate changes, resources use efficiency, inclusive, innovating and safe societies.

The state-of-the-art revels that EU is consciousness for the deficit in soil carbon and the consequences of intensive agriculture systems in the soil and water degradation. The most of the scientific reports cited were deliverable by the EU committee, providing sound evidences about the need of policies to regulate the use of the soil in the EU and stimulates the conservation agriculture systems. In fact, the last CAP and the projects as SOLIBAM and DIVERSIFOOD funded by FP 7 and H2020, respectively, reflect that there are effective new policies and strategies in EU for the soil, water and ecosystems conservation. One more effective way to influence these agendas will be through Focus Groups as EIP or Cost Actions working specifically to suggest policies and regulations to save the management land, water and soil quality in the southern Europe.

During the evaluation of new research proposal Multidisciplinary panel of evaluators is necessary for integrated approaches get funding. The national govern and private institutions should provide fund schemes to support research.Scientific knowledge and data should be freely available to avoid repeated research and it’s important the monitoring after the research ending.

10.7 Annexes

Annex Ia: NKS interviews in Portugal

Date of interview	Organisation	Interview	Fund-er	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-mana-gement
10-10-15	IPC	Daniela dos Santos			1		1						1		1	
24-09-15	CEVREME	António Sebastião & Duarte Candeias		1				1	1				1			1
31-08-15	*CIEO*	Ana Paula Barreira		1	1		1									1
06-11-15	IPB	Tomas Figueredo			1		1						1			1
22-10-15	Platforma do Golfe	Carlos Guerrero		1	1		1	1	1				1		1	1
20-10-15	IPCB	João Paulo Carneiro			1		1						1			
10-08-15	IPP	Luis Loures			1		1									1
01-09-15	CEOT	Dulce Antunes			1		1						1			1
21-10-15	ICNF	Espírito Santo Fernandes	1	1	1	1					1		1	1	1	1
21-10-15	UNISCAPE	Vera Ferreira			1		1				1			1		1
27-10-15	IPMA	Carlos Vale		1	1	1								1		
27-10-15	EDIA	Ana Ilhéu		1					1					1	1	
16-11-15	ICCAM	João Paulo Fernandes			1		1									1
27-10-15	UN-CNCD	Maria Roxo					1				1					
19-11-15	C Montemor-o-Novo	Rita Dionísio & Cândida Martins	1			1							1			1
10-10-15	UALG	Alcinda Neves			1		1						1		1	
15-10-15	MEDITBIO	Maria Belem Freitas			1		1									1

03-11-15	CIBIO	Marisa Graça			1		1									1
06-11-15	INIAV	Regina Menino & Amelia Castelo Branco		1	1	1	1						1	1	1	
	FCT	Dina Carrilho	1			1							1	1	1	1

Annex Ib: NKS Workshop participants in Portugal

Organisation	Interview	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
IPC	Daniela dos Santos			1		1						1		1	
CEVREME	Duarte Candeias		1				1	1				1			1
CIEO	Ana Paula Barreira		1	1		1									1
IPB	Tomas Figueredo			1		1						1			1
Platforma do Golfe	Carlos Guerrero		1	1		1	1	1				1		1	1
IPCB	João Paulo Carneiro			1		1						1			
IPP	Luis Loures			1		1									1
CEOT	Dulce Antunes			1		1						1			1
ICNF	Espírito Santo Fernandes	1	1	1	1					1		1		1	1
UNISCAPE	Vera Ferreira			1		1				1			1		1
CEVREME	António Sebastião		1				1	1				1			1
EDIA	Ana Ilhéu		1					1					1	1	
DRAALG	Ezequiel Pinho														

INIAV	Regina Menino		1	1	1	1						1		1	
UALG	Alcinda Neves			1		1						1		1	
MEDITBIO	Maria Belem Freitas			1		1									1
CIBIO	Marisa Graça			1		1									1
INIAV	Amelia Castelo Branco		1	1	1	1						1			
UALG	Thomas Panagopoulos			1		1						1			1
		19	1	6	13	3	11	1	2	0	2	0	11	2	5	9

Annex Ic: Agenda for NKS Workshop in Portugal

DRAFT agenda INSPIRATION national NKS workshop 6-7 November 2015,

1st floor, room 2.75, Edificio 9, Faculty of Economics, CIEO, Campus de Gambelas, Univ. Algarve.

DAY 1 – Morning SESSION: BIG GROUP, ALL WHO WANT TO CONTRIBUTE WELCOME

Time	Activity	Speaker or moderator
10.00	Walk-in (coffee /sandwiches offered?)	
10.30	Welcome, goal Today, introduction to program	NFP (Thomas Panagopoulos), Director of CIEO (Saul Jesus)
10.40	INSPIRATION: (re)introduction to the project	Stephan Bartke Coordinator of Inspiration
11.00	Brief presentations (10 minutes per topic) summarizing the results of the interviews & complementary desktop work:	
	a. SRA	NFP, or NFP co-worker
	b. SPI	NFP, or NFP co-worker
	c. Funding options	NFP, or NFP co-worker
11.30	Coffee/tea	
12.00	World Cafe, 3 tables, 20 minutes per table, enriching, completing and suggestion prioritization:	
	a. SRA	NFP, or NFP co-worker
	b. SPI	NFP, or NFP co-worker
	c. Funding options	NFP, or NFP co-worker
13.00	Lunch break	
14.00	Plenary presentation World Cafe outcome, followed by again possibility for enriching, completion and suggestions for prioritization:	
	a. SRA (20 minutes)	Reporter table a (volunteer NKS?)
	b. SPI (20 minutes)	Reporter table b (volunteer NKS?)
	c. Funding options (20 minutes)	Reporter table c (volunteer NKS?)
15.00	What next & closure	NFP
15.30	Short fieldtrip (optional): networking	NFP
20.00	Joint diner	

DAY 2 – MORNING SESSION: SMALL GROUP, SELECTED/INVITED NKS ONLY

Time	Activity	Speaker or moderator
09.30	Welcome back, goal Today, introduction to program	NFP
09.45	Synthesizing & finalizing the input for the national report in three parallel groups, groups formed before workshop (selected NKS for each group)	
	a. SRA	NFP, or NFP co-worker
	b. SPI	NFP, or NFP co-worker
	c. Funding options	NFP, or NFP co-worker
11.00	Coffee/tea	
11.30	Plenary presentation outcome synthesis, followed by final possibility by all for final comments	
	d. SRA (30 minutes)	Reporter table a (volunteer NKS?)
	e. SPI (30 minutes)	Reporter table b (volunteer NKS?)
	f. Funding options (20 minutes)	Reporter table c
12.50	Closure & farewell	NFP

Annex Id: NKS questionnaire template

Questionnaire template in Portuguese

A. Informação sobre a entrevista
País: Nome do investigador do INSPIRATION: Data da entrevista: Como é que a parte interessada (NKS) gostava de ser referida: *[Anónimo, opiniões pessoais, a opinião da empresa. Escolha quando será o melhor momento para discutir isso. No início ou mais tarde.* *MOSTRE ao entrevistado NKS o ENGAGEMENT CONSENT FORM e peça a ele / ela para preenchê-lo. Por favor, apresente o formulário (disponível em 'D2.1 MoU' e editável por si próprio) e entregue uma cópia ao entrevistado para ler e preencher - certificar-se de que guarda isso com você e mantenha para seus próprios registros.]*
B. Introduções
[Por favor, apresente-se, o projeto e o propósito da entrevista. Pode usar o folheto como previsto no final deste modelo, que também pode ser enviado previamente ao NKS. Chegar a acordo sobre um período de tempo: De aproximadamente uma hora e meia.]
C. Informações gerais sobre o entrevistado
1. Nome da parte interessada (NKS) entrevistada: 2. Empresa/Instituição: 3. Papel/Profissão:
4. A NKS é (várias respostas possíveis): ○ Autoridade Nacional-regional-local ○ Universidade/Centro de Investigação ○ Pequena-Média Empresa (SME, i.e. < 500 empregados) / Consultor ○ Comércio e indústria ○ Organização Não-Governamental (NGO) ○ Representante de uma rede ○ Outro, especifique:…

5. Especialidades (possibilidade de várias respostas):

   Peça para especificar sobre o item selecionado (s) a fim de compreender o nível de conhecimentos do entrevistado

   - Solo
   - Água
   - Sedimento
   - Planeamento urbano/espacial
   - Arquitetura
   - Gestão da terra/uso do solo
   - Outros especifique: …

6. A sua organização fornece financiamento externo de apoio à investigação?
   - Sim. Especifique: ... *[por exemplo: como titular, público, privado ...]*
   - Não

D. SRA

7. Quais os desafios sociais que você considera mais importantes?

   [Se necessário, você pode usar a lista Comissão Europeia (CE) para os desafios sociais. Estes temas da CE são:]

   - Contribuir para a proteção e segurança dos alimentos;
   - Assegurar fontes seguras de água potável;
   - Fornecimento e distribuição segura de energia;
   - Reduzir o consumo de matérias-primas e recursos; Garantir o uso eficiente dos recursos naturais;
   - Contribuir para a mitigação das alterações climáticas e adaptação da sociedade;
   - Contribuir para um ambiente de vida saudável;
   - Assegurar infraestruturas seguras.

   [Esses desafios podem ser utilizados como bases para a definição dos temas abrangentes para agregar os temas da nossa investigação SRA)

   a. Se for o caso, que desafios adicionais ou alternativos sugeriria/prefere?

   Conservação da natureza, uso sustentável dos serviços dos ecossistemas, travar a perda da biodiversidade

8. De acordo com a sua experiência: que tópicos específicos (necessidades de investigação) devem ser incluídas na SRA?

   Para cada tópico, faça as seguintes questões.

   g. Explique - elaborar o tópico

   - *Quem irá ser afetado?*
   - *Quem é responsável?*
   - *É um tema de preocupação da sua organização / departamento*
   - *É apenas um tópico nacional ou partilhado por mais Países?*
   - *Onde estamos, e onde queremos estar daqui a x anos? (ponto no horizonte)?*
   - *Como pode o conhecimento adquirido ser efetivamente usado?*

h. Prioridade

   Elevada prioridade

   Alguma prioridade

   Prioridade Neutra

   Baixa prioridade

   Sem prioridade

- Qual é a urgência, ou seja, o que está errado se não fizermos nada?

   i. Quem quer / deve financiar este tipo de investigação?

   [Opcionalmente: Referir as seguintes palavras-chave WP3 para a relevância, ou seja, verificar se levantam quaisquer temas adicionais pelo NKS.

   As palavras-chave podem ser utilizados como lista de suporte.

   Seja sensível como entrevistador, se necessário.]

   - *Avaliação dos recursos terrestres*
   - *A produtividade potencial da terra e dos solos*
   - *A procura por solo e recursos terrestres, importações e exportações*
   - *A competição entre usos do solo (conflitos de uso do solo)*
   - *Conceitos para identificar e quantificar impactos relevantes*
   - *Instrumentos para parar/ minimizar impactos (feedback para o processo de tomada de decisão)*
   - *Oportunidades de tecnologias inovadoras de uso do solo*
   - *Sistemas de gestão orientados para o recurso solo*
   - *Regeneração do solo*
   - *Remediação do solo e água subterrânea*

9. Relacionado com os tópicos mencionados pelo NKS:
   a. Quais são os documentos importantes / relevantes, agendas de pesquisa, programas de pesquisa que sustentam esses temas? (Estado da arte)
   b. Relacionado com estas agendas e programas: quais os cronogramas e "janelas de oportunidade" que influenciam os mesmos?

E. Ciência-Política-Interface (SPI)

10. Como define 'Conhecimento científico'?

11. Para que usa esse conhecimento na sua profissão?

12. Que recursos de conhecimento (científico) usa na sua profissão?

    [Pergunta aberta e pode mencionar algumas das fontes em baixo como exemplos]

    - *Artigos Científicos*
    - *Consultores*
    - *Relatórios*
    - *Colegas*
    - *Experiências /exemplos dentro do seu País*
    - *Experiências /exemplos no estrangeiro*
    - *Jornais*
    - *Televisão*
    - *Conferências e Envolvimento em projetos de investigação*
    - *Bases de dados*
    - *websites, como: …..*
    - *outros, especifique: …..*

13. Em que medida você usa o mais recente/novo conhecimento cientifico (i.e. estado da arte/resultados) na sua profissão?

14. Até que ponto você é capaz de influenciar (e como) a definição de políticas de investigação científica/agendas no país?

15. Até que ponto as políticas e agendas nacionais refletem as suas necessidades e prioridades específicas?

16. Até que ponto tem sido usado o estado de arte da investigação científica para formulação das políticas existentes no país?

[Perguntas só para os NKS que não pertençam ao sector da ciência (negócios e políticas):]

17. Alguma vez esteve envolvido:
    a. Na formulação de questões de investigação científica?
    b. Fazer investigação científica (i.e. knowledge co-creation)?
    c. Sintetização do conhecimento científico, e.g. para sustentar a formulação de políticas ou para aumentar as oportunidades de negócios?

[Quando sim: Responder às questões]

- De que forma foi em termos de sucesso/satisfatório, numa escala de 1-5?
    1. *Muito satisfatório/bem-sucedido*
    2. *Satisfatório*
    3. *Neutro*
    4. *Insatisfatório/Sem sucesso*
    5. *Muito insatisfatório*
- O que correu bem?
- O que pode ser melhorado?
- O que evitar/ o que não fazer?
- Comentários adicionais?

[Pergunta apenas para NKS que são susceptíveis de ter percepções aqui (por exemplo, os financiadores de pesquisa)]

18. (Como) é o impacto social da investigação científica relacionada com âmbito do projeto INSPIRATION?

[Se conhecem: respondam às questões seguintes]

Em que medida tem sucesso/ é satisfatório numa escala de 1-5?

1. *Muito satisfatório/bem-sucedido*
2. *Satisfatório*
3. *Neutro*
4. *Insatisfatório/Sem sucesso*
5. *Muito insatisfatório*

- Quais os indicadores usados?
- O que corre bem?
- O que pode ser melhorado?
- O que deve ser evitado?
- Comentários adicionais?

19. Que documentos nacionais de Interface Ciência-Política conhece ou recomenda?

F. Financiamento

20. Que experiências e expectativas de esquemas de financiamento (público-privado) tem na sua área que possam oferecer oportunidades para futura pesquisa de uso e gestão do solo e os impactos nos sistemas SSW (Soil-/Sediment-/Water-systems):
    - Regional/ local?
    - Nacional?
    - Europeu? [*e.g. H2020, Interreg, multi-lateral such as the Joint Programming Initiatives*]
    - Internacional? [*e.g. Belmont Forum, Foundations etc.*]

    [Para todas as questões de investigação e inovação que visem atingir objetivos políticos no sistema Land & SSW (como por exemplo: Objetivos de desenvolvimento sustentável em solos -para ser adotadas a nível da ONU em Setembro de 2015-, diretivas da UE, como a Diretiva de Responsabilidade Ambiental, etc.). Considere todas as fontes de financiamento público e privado. Por favor, peça para fornecer detalhes e dar referências mais importantes (documentos, website) que possam ser relevantes para explicar a resposta]

21. Como aumentar o valor acrescentado dos diferentes recursos financeiros (ou seja, atingir um multiplicador) para fazer investigação que contribua para a UE e exigências nacionais, em particular, às exigências R&I nos sistemas de terra e SSW (água-solo-deimentos)?
    [*CONSTRUÇÕES que (podiam) trabalhar. PP, PPI, etc. Apenas pergunte sobre sugestões, ideias, experiências, bons exemplos*].

22. Existem áreas de investigação e inovação (I & I) que você está ciente de que não estão (ainda) abrangidos por mecanismos de financiamento atuais e que precisam de novos / diferentes regimes de financiamento / infraestruturas?

23. As abordagens integradas (necessárias para enfrentar desafios sociais específicos relacionados ao uso e gestão do solo e impactos relacionados a sistemas de SSW) são normalmente difíceis de financiar/ ser reconhecido pelas comunidades de financiamento da investigação. O que seria necessário para melhorar isso?

24. Com base em experiências anteriores de aprendizagem que esteja ciente: qual a melhor forma de configurar/governar opções de financiamento, de forma a que as exigências sociais sejam cumpridas, que os conhecimentos resultantes seja usados; e os financiadores experienciem que o seu investimento é multiplicado?

    [Se conhecem:]

    - Em que medida é isto satisfatório, numa escala de 1-5?
        1. *Muito satisfatório/bem-sucedido*
        2. *Satisfatório*

3. *Neutro*
4. *Insatisfatório/Sem sucesso*
5. *Muito insatisfatório*

- O que correu bem?
- O que pode ser melhorado?
- O que deve ser evitado?
- Comentários adicionais?

G. Outros (Comentários, sugestões, exemplos):

H. Fim da entrevista

Obrigado por participar nesta entrevista:

- Gostaria de se manter atualizado sobre o progresso do INSPIRATION?
- Sugere alguma pessoa que deveria ser entrevistadoa por nós?
- Tem mais perguntas decorrentes desta entrevista, ou gostaria de acrescentar mais alguma coisa?
- Em que informações está interessado, e disposto a dar feedback sobre?

[Discutir o mecanismo de feedback e se eles têm expressado as suas opiniões como uma pessoa ou como representante de sua organização / rede. Checklist:]

a. Informações para troca / vontade de dar feedback sobre:

- (entrevista completa, não recomendado)
- resumo das principais conclusões
- relatório nacional, a contribuição nacional para D2.4
- completar o D2.4, todos os países

b. Nível preferido do feedback:

- nenhum feedback
- feedback informal
- retorno formal (por exemplo, em nome da organização representada)

[Confirme: foi discutido o formulário de consentimento / como fazer referência a entrevistado]

Annex Ib: NKS hand-out: INSPIRATION interview at a glance

See Chapter 1, Annex II

11. Romania

Report by Mihail Dumitru, Sorin Liviu Stefanescu, Andrei Vrinceanu, Valentina Voicu, Nicoleta Vrinceanu

11.1 Executive summary

11.1.1 English version

The Romanian National Focal Point has launched its assigned activities within the frame of the INSPIRATION project by organizing a National Workshop in September 2015 in Agigea-Constanta. During the debates, the participants identified three fields of issues with regard to SSW-system and the existing research agenda: (i) the many small farmers in Romania are poorly informed about environmental practices whilst the research and innovation sector is not sufficiently adapted to the specific needs of farmers; (ii) the good natural environment of Romania provides opportunities scarcely used and (iii) the low productivity in agriculture relates, among others, to the low use of the inputs in agriculture or the unsufficient/unproper use of alternative and environment friendly inputs.

The questionnaire based study has revealed that overall, the societal challenges and needs perceived as important by the respondents (NKSs) follow a pattern of priorities fairly conected with the one of the issues debated within the national workshop. The “Contribution to food security and food safety“ is seen (quantitatively) as the highest priority. Some respondents commented additionally on this particularly topic that “soil fertility conservation, degraded land remediation, crop technologies for polluted soils are ever lasting important research issues.” The second ranked priority is shared by “Reduce raw material and resource consumption, Ensure efficient use of natural resources” (with comments like “soil quality monitoring contributes to the decrease of fertilizers consumption”), and “Contribute to a healthy living environment” (with additional comments like ”it is the highest challenge of the modern society”, “pollution sources monitoring and the pollutants impact on agro-systems and food are seen as important research topics by EC”, or “organic farming is a fair alternative”). The two secondly ranked options are followed close on third place by “Contribute to climate change mitigation and societal adaptation”. The last priority is given to “Ensure secure infrastructure”.

The three areas of issues discussed during the national workshop of September 2015 were conected with the main (“top three”) societal challanges and options, as perceived by the respondents to the questionnaire. Finally, three related important topics/research needs were selected and accordingly drafted.

RO-1: Food security and food safety. Soil and water management environmentally oriented practices: a need for more practical tools for farmers.

The proposed research topic is grounded by assessments revealing a need for more practical farm-oriented approaches and development of decision support tools for farmers. The related key questions/issues to be answered on this particular topic are (i) how food security and food safety simultaneously can be achieved with a minimum impact on soil, water and biodiversity?, (ii) development of practical tools able to respond to the risks induced by soil degradation processes under the global climate change impact and (iii) fresh water: how soils can be managed with regard to an intelligent use of continuously decreasing water resources?

RO-2: A healthy living environment. Organic farming fits the current state of the soil quality and land use in the country? Well, yes.

The proposed topic stems from the fact that organic farming has become an important aspect of the European agri-environmental policy. Over the last years, Romania has seen a steady and rapid rise in the amount of land and number of holdings adhering to organic standards but yet the organic farming national share is almost three times less then EU average. The relative low level of pollution in Romanian's agriculture continues to provide good opportunities for conversion to organic practices. The key questions/issues to be answered on this topic are related with (i) establish at least two long term trials/demo fields (in plain and hilly side of the country, respectively) for organic vs. conventional farming, to get a multidisciplinary approach in terms of soil quality, environmental impact of inputs use, energy consumption, productivity levels, biodiversity conservation or restoration and trends of GHG emissions, (ii) improve the level of awareness and understanding regarding the environmental benefits of organic farming in agricultural schools and universities and among farmers by a multi-leveled curriculum developed for technical, vocational and continuing training, (iii) develop a large-scale research, extension and implementation program for small and medium grassland holdings converting to organic farming and (iv) develop a private-public partnership cluster research/inspection bodies/farmers associations for organic farming inputs certification.

RO-3: Raw material and resource consumption. Nutrients: maintain and improve soil fertility under the increased demand of higher yields and increased rates of nutrients export.

The related key questions/issues refer to (i) the optimized use of synthetic fertilizers under the global climate change impact, (ii) waste recycling: a better use of soil as bio-geo-chemical reactor to prevent its contamination and sustain its productive potential and (iii) climate change: how soils productivity and resilience will be affected?

The NFP study revealed that some respondents see for a prospective improvement that "SRA agenda should be applied in all MS, not only in the developed MS" and "The widening of the gap in terms of research, between different MS" should be avoided. Also a Soil Directive and a European Research Program for SSW system is seen as very much needed.

By conecting the content of discussions held in the National Workshop with the results of the questionnaire based study, the following top of the most important national Science-Policy-Interface documents came front:

I. National Strategy for Research, Development and Innovation 2014-2020;
II. National Rural Development Program 2014 – 2020;
III. Strategy for the agri-food sector medium and long term development – horizon 2020/2030.

The majority of respondents of the questionnaire based study agreed with the fact that a significant number of areas of research and innovation (R&I) are not (yet) covered by current funding mechanisms in Romania. Little attention is given to the soil issues, with particular emphasize to water and plant relationship. With regard to the sediment, there is no interest recorded at all.

Under the present circumstances with no clear European legislation regarding soils, the only national financial sources for research rely on the Ministry of Education and Research and the Ministry of Agriculture and Rural Development, and in a lesser extent, on the Ministry of Environment, Waters and Forestry (rather on contractual basis then through periodically competition based grants).

There are no regional funding options. The external (international or European) funding has low values and the national private funding options are close to zero.

11.1.2 Romanian version

Punctul Focal Naţional al României şi-a lansat activităţile desemnate din cadrul Proiectului INSPIRATION prin organizarea unui Atelier Naţional de Lucru în luna septembrie 2015, în localitatea Agigea, Constanţa. În timpul dezbaterilor, participanţii şi-au concentrat discuţiile pe trei probleme centrale relaţionate sistemului Sol-Sediment-Apă şi agendei existente de cercetare: (i) micii fermieri din România sunt puţin informaţi despre practicile agricole benefice pentru mediu iar sectorul de cercetare şi inovare nu este suficient de adaptat nevoilor fermierilor, (ii) calitatea general bună a mediului în România furnizează oportunităţi prea puţin utilizate şi (iii) randamentele scăzute în agricultură au legătură, printre altele, cu folosirea unui nivel scăzut de aporturi sau folosirea insuficientă/necorespunzătoare a aporturilor alternative, prietenoase cu mediul.

Studiul realizat prin completarea unor chestionare de către reprezentanţi ai grupurilor de interes a evidenţiat faptul că provocările societale şi necesităţile identificate de respondenţi urmează un tipar al priorităţilor destul de asemănător cu cel al problemelor dezbătute la atelierul de lucru. Opţiunea “Contribuţii la securitatea şi siguranţa alimentară“ a fost considerată (cantitativ) cea mai importantă prioritate. Unii respondenţi au avut comentarii adiţionale la acest subiect: “conservarea fertilităţii solurilor, remedierea terenurilor degradate sau tehnologiile de cultivare a solurilor poluate constituie tematici permanente de cercetare“. Cea de-a doua prioritate este împărţită egal între “Reducerea consumului de resurse şi materii prime şi asigurarea utilizării eficiente a resurselor naturale“ (cu comentarii adiţionale ca “monitorizarea calităţii solurilor contribuie la scăderea consumului de îngrăşăminte“) şi “Contribuţii la un mediu de viaţă sănătos“ (cu comentarii adiţionale ca “aceasta e cea mai importantă provocare a societăţii moderne”, “monitorizarea surselor de poluare şi impactul surselor de poluare asupra sistemelor agricole sunt considerate de către CE subiecte de cercetare importante“ sau “agricultura ecologică este o alternativă serioasă“), urmate la mică distanţă pe locul trei de “Contribuţii la atenuarea schimbărilor climatice şi adaptarea societăţii“. Pe ultimul loc al selecţiei respondenţilor se află opţiunea “Asigurarea unei infrastructuri securizate“.

Cele trei domenii ale problemelor şi necesităţilor discutate pe parcursul atelierului naţional din septembrie 2015 au fost conectate celor mai importante trei provocări societale şi opţiuni, aşa cum au fost percepute de respondenţi prin chestionarele completate. Pe baza acestora, au fost selectate şi configurate pe scurt, trei subiecte/necesităţi de cercetare.

RO-1: Securitate şi siguranţă alimentară. Practici ambientale de gestionare a solului si apei: necesitatea pentru dezvoltarea unor instrumente practice destinate fermierilor.

Subiectul propus este fundamentat pe evaluări ce susţin necesitatea unor abordări mai practice pentru fermieri şi dezvoltarea unor instrumente de sprijin al deciziei de management. Întrebările/problemele cheie relaţionate acestui subiect particular se referă la (i) cum pot fi asigurate simultan securitatea şi siguranţa alimentară cu un impact minim asupra solului, apei şi biodiversităţii, (ii) dezvoltarea unor instrumente practice capabile de răspuns la riscurile induse de procesele de degradare a solului în contextul schimbărilor climatice globale şi (iii) apă proaspătă: cum pot fi gestionate solurile în condiţiile unei utilizări inteligente a resurselor de apă aflate într-un proces continuu de epuizare.

RO-2: Un mediu viu şi sănătos. Agricultura ecologică este o alternativă potrivită nivelului actual al calităţii solului şi folosinţei terenurilor în România? Ei bine, da!

Subiectul propus rezultă din situaţia în care agricultura ecologică a devenit un aspect important al politicii europene de agro-mediu. În ultimii ani, România a cunoscut o creştere constantă şi rapidă a suprafeţelor de teren ce aderă la standardele ecologice. Totuşi, proporţia la scară naţională este aproape de trei ori mai mică decât media UE. Nivelul relativ scăzut al poluării în agricultura românească furnizează bune oportunităţi pentru conversia la agricultura ecologică. Întrebările/problemele cheie cu privire la acest subiect se referă la: (i) stabilirea a cel puţin două loturi experimentale/demonstrative pe termen lung (pentru zona de şes, respectiv colinară) pentru studiul comparativ ecologic vs. convenţional, în vederea unor evaluări multidisciplinare privind calitatea solului, impactul ambiental al aporturilor agricole, consumul de energie, randamente, conservarea biodiversităţii şi tendinţele emisiilor de gaze cu efect de seră, (ii) îmbunătăţirea nivelului de conştientizare şi înţelegere privind agricultura ecologică în educaţia în şcoli şi universităţi agricole dar şi printre fermieri printr-o programă multistratificată dezvoltată pentru instruirea tehnică, vocaţională şi continuă, (iii) dezvoltarea unui program complex de cercetare, extensie şi implementare a conversiei fermelor mici şi medii de pajişti permanente şi (iv) dezvoltarea în parteneriat public-privat a unui cluster al cercetării/inspecţiei/asociaţii de fermieri pentru certificarea aporturilor în agricultura ecologică.

RO-3: Materii prime şi consumul resurselor. Nutrienţi: menţinerea şi îmbunătăţirea fertilităţii solului sub presiunea cerinţelor de recolte din ce în ce mai ridicate şi creşterii continue a ratelor de export al nutrienţilor.

Întrebările/problemele cheie se referă la: (i) utilizarea optimizată a fertilizării sintetice în condiţiile impactului schimbărilor climatice, (ii) reciclarea deşeurilor: o utilizare îmbunătăţită a solului ca reactor bio-geo-chimic pentru prevenirea contaminării şi susţinerea capacităţii sale productive şi (iii) schimbările climatice: cum vor fi afectate productivitatea şi rezilienţa solurilor?

Studiul sociologic realizat a evidenţiat faptul că respondenţii au aşteptări privind o eventuală îmbunătăţire a politicii europene care va lua în considerare ca “agenda de cercetare să fie aplicată în toate Statele Membre, nu numai în cele mai dezvoltate” iar “creşterea diferenţelor în cercetarea efectuată în Statele Membre” va fi evitată. Deasemenea, o Directivă a Solului şi un Program European de cercetare în domeniul sistemului Sol-Sediment-Apă sunt văzute ca necesare.

Conectând conţinutul discuţiilor purtate în timpul atelierului naţional din septembrie 2015 cu rezultatele studiului bazat pe implementarea chestionarelor, a fost formulată lista celor mai importante documente naţionale de Interfaţă Ştiinţă-Politică din domeniu:

I. Strategia naţională de cercetare, dezvoltare şi inovare 2014-2020
II. Programul Naţional de Dezvoltare Rurală pentru perioada 2014-2020 şi
III. Strategia pentru dezvoltarea sectorului agroalimentar pe termen mediu și lung – orizont 2020/2030.

Majoritatea respondenţilor au semnalat că un număr semnificativ de domenii importante de cercetare şi inovare nu sunt finanţate (încă) corespunzător. Este acordată puţină atenţie problemelor de sol şi cu atât mai puţin relaţiilor acestuia cu apa şi culturile.

În circumstanţele existente, fără reglementări europene clare în domeniul solului, principalii contributori financiari ai cercetării sunt Ministerul Educaţiei Naţionale şi Cercetării Ştiinţifice şi Ministerul Agriculturii şi Dezvoltării Rurale şi într-o mai mică măsură, Ministerul Mediului, Apelor şi Pădurilor (pe bază de contracte mai degrabă decât pe licitarea periodică competitivă de proiecte).

Nu există opţiuni de finanţare regională în domeniu. Finanţarea externă (internaţională sau europeană) are un nivel scăzut iar opţiunile de finanţare privată naţională sunt aproape inexistente.

11.2 Methodology followed

The present national report (the deliverable D2.5) presents the reviewed and synthesized information collated for Romania. It follows the previously submitted deliverable 2.4 - "National report on collated information following the template - Romania" which includes information collated in accordance with INSPIRATION D2.3 "Template for national information collation".

The Romanian D2.5 report includes: 1) results of a National Workshop organized by NFP in-between 10-13 September 2015 in Agigea-Constanta; 2) results of the NKS interviews; 3) the desk exercise performed by the NFP in Romania.

In September 2015, 15 participants representing different stakeholders groups attended the National Workshop held in Agigea-Constanta. In the opening stage, the NFP made a presentation of the INSPIRATION Project aims and objectives as well as the expected outcomes of the Project's WP2, WP3 and WP4 and the connected assigned activities for the NFP and the Romanian team involved. The second point of the agenda was dedicated to a comprehensive NFP's presentation given with regard to the available figures, statistics and assessments emphasizing the status of the SSW system in Romania. The last presentation was held by a leading soil scientist on the soil and water quality assessment based on the recent SWOT analyses of the "Romanian National Rural Development Program 2014–2020".

A first round of debates allowed the participants to become acquainted with each other and to raise answers and get a more clear insight of the INSPIRATION approach. They discussed toghether what should be the content of the Romanian contribution and inputs for the Project and shared views on the impact of the societal challanges and pressures on the public and policy makers interest regarding land use, soil and water management and environment quality. Some of the commonly agreed discussions' contents were included in the desk study. An important topic has been raised with regard to the public perception of the researcher's profile in Romania and its low potential to influence the policy makers' agenda.

The second part of the workshop was dedicated to the presentation of the last updated version of the Project's NKS questionnaire template. The workshop agenda made room available for questions regarding ways for methodologically adequate filling up answers in the questionnaire. Couple of the first questionnaires were completed individually in the last part of the workshop.

The participants have welcome the Project strive for an improved agreements and coordination between EU and Member States in terms of tackling the priorities of research and innovation programs as well as research funding opportunities.

Using the INSPIRATION D2.3 "Template for national information collation", overall 23 NKS were interviewed in Romania; the information collected in the interviews has been processed and fed the questionnaire based study.

The draft version of the Romanian deliverable D2.5 – National report with a review and synthesis of the collated information, was sent for review, comments and improvements to all the 23 interviewed NKS.

Details on the interviewed NKS are provided in Annex I. The desk study was based on documents as suggested by NKS. These are listed in Annex II. In Annex III is provided a tentative list of research and innovation funding options in Romania.

11.3 Research and Innovation (R&I) needs

11.3.1 Societal challenges and needs

The questionnaire based study reveals that overall, all the topics (options) listed in the NKS questionnaire template under the question "Which societal challenges do you regard as important?" are seen by respondents as important. Couple of respondents has ticked all the options: (i) Contribute to food security and food safety; (ii) Ensure secure supplies of safe drinking water; (iii) Secure energy supply and distribution; (iv) Reduce raw material and resource consumption, Ensure efficient use of natural resources; (v) Contribute to climate change mitigation and societal adaptation; (vi) Contribute to a healthy living environment; (vii) Ensure secure infrastructure.

The *"*Contribution to food security and food safety*"* is seen (quantitatively) as the highest priority. Some respondents commented on this particularly topic that "*soil fertility conservation, degraded land remediation, crop technologies for polluted soils are ever lasting important research issues."* The second ranked priority is shared by "Reduce raw material and resource consumption, Ensure efficient use of natural resources**"** (with comments like *"soil quality monitoring contributes to the decrease of fertilizers consumption"), and "*Contribute to a healthy living environment" (with comments like "*it is the highest challenge of the modern society"*, "*pollution sources monitoring and the pollutants impact on agro-systems and food are seen as important research topics by EC*", or "*organic farming is a fair alternative"),* followed close on third place by *"*Contribute to climate change mitigation and societal adaptation" (with comments like *"agro-forestry measures on degraded lands and anti-erosion undertakings limit the effects of climate changes").*The last priority is given to "Ensure secure infrastructure", maybe related to the fact that no respondent is somehow directly related with infrastructure on a professional basis.

Additionally, there are recorded many other or alternative challenges suggested by the respondents, as following: nature conservation, sustainable use of the eco-systemic services, stopping the biodiversity losses, organic farming and the use of organic fertilization for preventing soil degradation and soil nutrients depletion, decrease of the agricultural superficies due to the inadequate land use, improper use of the forestry resources, remedial fertilization used in agriculture without compliance to agro-chemical needs, conservation and protection of renewable natural resources (soil, water, air, biodiversity) and sustainable use of agricultural natural resources, use of higher quality seeds and seedlings (drought and pest resistant) for climate change adaptation, development of a set of indicators for the international (cross-border) use of agricultural lands, upscale the rural located public agricultural advisory system and compliance of the national education and research system with EU-15 countries.

11.3.2 Topics / research needs to include in the SRA

During the national workshop of September 2015, the most intensive debates were dedicated to the following fields of interest considered to be highly relevant according to the issues identified in the available assessments (e.g. Romanian National Rural Development Program 2014–2020):

- Most farmers in Romania, especially those who own small and medium-sized holdings, do not have the proper knowledge in the field of management methods, modern production technologies and food safety standards, focusing mainly on traditional practical experience. In addition, they do not have sufficient knowledge about the environmental practices that bring benefits to biodiversity, soil and water and do not have information on agricultural practices that contribute to a better adaptation to climate change in risky areas and reduction of GHG emissions. The research and innovation sector is not sufficiently adapted to the specific needs of farmers. The modest collaboration between farmers and stakeholders promoting innovation and research has led to a limited research and innovation transfer from suppliers to farmers. It is therefore necessary that the specific problems of farmers in terms of environmentally-friendly practices, the optimal use of resources and production factors find solutions in the development of innovative products and processes.
- The natural environment of Romania is generally characterized by a good preservation of natural resources of soil and water, variety of traditional landscapes and a remarkable biological diversity. Romania has one of the richest resources of agricultural land that can be classified as having high nature value (ranked 5th in EU-27 with a surface of over 5 mil ha). However, some of these resources are subject to pressure factors impacting on their productive potential, quantitatively and qualitatively. Regarding the area of land fund, between 2006 and 2012 there was a slight decrease of agricultural area and an increase of the area covered by unproductive and degraded lands (by 11.6%). Whilst Romania has good quality soils (however threatened by various negative phenomena), the freshwater resources are reduced and unevenly distributed, which puts Romania in the category of countries with scarce water resources. The land management alternative with the best soil and water protection performances is organic farming but the area cultivated under organic farms is still low, compared with EU-27.

- The yields in the Romanian agriculture have a modest level, indicating a use of production factors far below the optimum values. The average cereal production per ha in Romania continues to be 30% below the EU level (2013). The are couple of reasons for the low agriculture productivity. One is that the average size of a Romanian farm is more than 4 times lower than the European one and the fragmentation degree is very high, the average size of a parcel being of 0.45 hectares (each farmers owning, on average, 4.8 parcels). Other reasons are related with the low use of the inputs in agriculture or the unsufficient/unproper use of alternative input sources. However, in Romania, the pressure exerted by fertilizers and pesticides on soil and water is low, but the use of chemical fertilizers in agriculture has a tendency to increase by 13% in 2012 compared to 2007. The SWOT analyses of the "Romanian National Rural Development Program 2014 – 2020", signals many issues like: low yields of field crops in relation to production potential and high variations in productivity for some species on cultivated areas, improper management of waste from agricultural activities especially in small-scale farms, increased negative impact of agricultural activities on environment as a result of intensification of agriculture (especially on the most productive farmlands), accentuation of the negative effects, particularly on water resources, resulting from the use of bad technology or not-adapted technology to local conditions and the insufficient correlation of agricultural research sector (including the research relevant for the specific challenges related to climate changes mitigation and adaptation) with the agricultural practice.

The three areas of issues discusessed during the national workshop of September 2015 have been conected with the main societal challanges and options as perceived by the respondents to the questionnaire ("top three"). Finally, three related important topics/research needs were selected and drafted, as following:

RO-1: Food security and food safety. Soil and water management environmentally oriented practices: a need for more practical tools for farmers.

The continuous growing world demands for food consumption and the last decades public concerns on environment issues linked to an increased number of "food scares" has led to a committed seek for achieving a sustainable agriculture and viable agricultural systems as critical issues for both food security and food safety, if not in all, but for sure in most of the developed countries, where the technological products of modernity have produced innumerable benefits as well as unforeseen risks. Improvement in agricultural sustainability requires, alongside effective water and crop management, the optimal use and management of soil fertility and soil physical, chemical and biological properties. Carried assessments reveal a need for more practical farm-oriented approaches and decision support tools are recently used for farmers up taking of soil and water management practices and experiences.

Specific research questions:

Land management

- How food security and food safety simultaneously can be achieved with a minimum impact on soil, water and biodiversity?
  Why: Viable technical support is needed to respond to the most common farmer's questions: Where we can produce more? Which are the types of holdings with the highest growth potential? Where this kind of growth puts the lowest pressure on soil, water and biodiversity resources?

Net impacts

- Development of practical tools able to respond to risks induced by soil degradation processes under the global climate change impact.
  Why: At country level, there are recorded significant soil degradation processes developed in the agricultural area: soil erosion, organic matter and biodiversity losses, soil contamination, soil cover with low-permeability artificial structures, soil compaction, soil alkalinity/salinity.

Land management and Net impacts

- Fresh water: how soils can be managed with regard to an intelligent use of continuously decreasing water resources?
  Why: There is a certain need for an improved water use in the farms. A better insight of the soil-water-sediments-plant system will lead to a better shaped range of water stress resistant crops and varieties. It is expected that water deficit during drought periods will lead to an increased number of dams built on almost all rivers across the country. The occurring run off erosion and dam lakes silting (with sediments) have to be assessed and predicted by a long-term plan for minimizing the impact of soil erosion in the collector river basins.

RO-2: A healthy living environment. Organic farming fits the current state of the soil quality and land use in the country? Well, yes.

Introduction or maintenance of organic farming is often, together with extensive farming systems, applied in order to maintain and enhance soil functionality. Organic farming tends to conserve soil fertility and system stability better than conventional farming system, mainly due to higher organic matter contents, higher biological activity and higher erosion control potential. Soil pollution associated with manufactured pesticides is absent. Moreover, organic farming performs better than conventional farming in respect to natural ecosystems, floral and faunal diversity and provides potentials that result in positive effects on wildlife conservation and landscapes. In response to the recent increasing concern for the environmental issues, particularly with regard to biodiversity loss, climate change, soil, water and air pollution and depletion of natural resources, organic farming has become an important aspect of the European agri-environmental policy. The positive effects of organic farming practices to the environment have been systematically studied during the last decades. Since late 90's, Romania has also joined the European research area concerning the environmental benefits of organic farming but not much has been done lately in terms of continuity and systematic approaches. Even if Romania the share of "potential fertile soils" is significant (Chernozems and Phaeozems are roughly 1/3 of UAA), the present use is highly unsustainable (degradation, poor management, nutrients depletion etc).

Specific research questions:

Net impacts

- Establish at least two long term trials/demo fields (in plain and hilly side, respectively) for organic vs. conventional farming, to get a multidisciplinary approach in terms of soil quality, environmental impact of inputs use, energy consumption, productivity levels, biodiversity conservation or restoration and trends of GHG emissions.

Why: DG-AGRI noted in September 2014 on the observations on the Rural Development Program 2014-2020 in Romania that particular attention should be paid to the aid calculation as consistent technical and economical information on organic farming are not available in the country and the calculation is based primarily on expert assumptions. Romania should set in place the necessary systems to collect and reinforce data on the Romanian situation for any future revision of the aid calculations under the measure for organic farming. Moreover, as the calculation is made at country level only, the regional specificity is almost missed and there are debates whether Romania should tackle the support for organic farming on a regional based approach.

Demand

- Improve the level of awareness and understanding regarding the environmental benefits of organic farming in agricultural schools and universities and among farmers by a multi-leveled curriculum developed for technical, vocational and continuing training.

  Why: Still in schools and universities the Agro-chemistry topics overwhelming prevails and prejudgments for scholars/students are set on long term without a drafted choice balanced curriculum. There is a need for including theoretical and practical topics environment oriented and an increased societal awareness (with stakeholders in the first place) on the side-effects of the chemical inputs use. On the other hand, the public advisory agricultural system (significantly small sized famers oriented), lacks a proper expertise on organic farming.

Natural capital

- Develop a large-scale research, extension and implementation program for small and medium grassland holdings converting to organic farming.

  Why: Over the last years, Romania has seen a steady and rapid rise in the amount of land and number of holdings adhering to organic standards but yet the organic farming national share is almost three times less then EU average. The relative low level of pollution in Romanian's agriculture continues to provide good opportunities for conversion to organic practices. In spite its highest bio-geographical diversity in EU-27 as well as its semi-natural ecosystems cover (47% of the entire area of the country), the amount of 3.4 mil ha grasslands plus 1.5 mil hayfields (34 % of the entire Romanian agricultural area) is very, very low converted to organic (less than 100,000 ha). Organic farming provides also better employment rates than conventional agriculture in rural areas.

Demand

- Develop a private-public partnership cluster research/inspection bodies/farmers associations for organic farming inputs certification.

  Why: More diversified organic farming inputs await to be certified (fertilizers and pest-control inputs). The research institutions have the needed expertise and share a certain public trust on its findings; the private inspection bodies have the legal means for certification whilst the farmers associations have the larger practical experience of input use. A legal and clear frame for organic farming inputs is very much needed.

RO-3: Raw material and resource consumption. Nutrients: maintain and improve soil fertility under the increased demand of higher yields and increased rates of nutrients export.

Soil nutrient levels can decrease over time when crop plants are harvested, as nutrients are not returned to the soil. Essential nutrients needs to be compensated either through the natural process of decomposition or by the easy means of adding fertilizers. Chemical fertilizers increase crop production but their overuse may have harmful effects on the soil and water, especially when they are very concentrated and water soluble and may ultimately end up leaking into our water bodies, ponds, streams, groundwater and contaminate water supply. The increasing costs for energy are another point of concern for chemical fertilizers consumption. Seeking for alternatives, largely accessible organic wastes can be turned into valuable compost products for raising crops organically and replacing the use of chemical fertilizers. With higher urbanization, continuous growing cities and increased agricultural productivity, the municipalities, industries and agriculture farms are generating huge amounts of organic wastes but their disposal and use may pose serious threats to the environment and societal risks to the human health.

Specific research questions:

Net impacts

- Optimized use of synthetic fertilizers under the global climate change impact.
  Why: Energy and raw materials are scarce every day, everywhere. Costs for fertilizers are continuously increasing. Prevention of soils and groundwater pollution from chemical fertilizers use is mandatory.

Natural capital

- Waste recycling: a better use of soil as bio-geo-chemical reactor to prevent its contamination and sustain its productive potential.
  Why: The proper management of agricultural, urban and industrial is one of the most important challenges of the last decade's modern society. The most recent approaches focus on the design of systems able to convert the wastes into resources. Developing locally adapted waste recycling systems (connected with local soil remediation needs), will reduce the risks related to waste long distance transportation. As the entire world population is getting more and more urbanized, the sewage sludge use in agriculture needs to fit better to soil, water bodies/groundwater and yields environmental quality.

Net impacts

- Climate change: how soils productivity and resilience will be affected?
  Why: The human induced impact on environment is raising more and more public concerns. Even the smallest environmental changes should be identified and carefully assessed, as they might grow to an extent and magnitude unable to be controlled. Proper land use management systems have to be design in order to mitigate the climate change impact with regard to carbon sequestration in agricultural and forestry lands, reducing agricultural land CH_4 and NO_2 gases emissions, biomass for bio-fuels.

Among the responents' answers related with important/relevant documents, research agendas, research programmes underpinning these topics, the stakeholders have listed The National Plan for Rural Development 2014 - 2020, the National Strategy for Agri-food Sector Development on Medium and Long Term, the UEFISCDI National Plan for Research, Development and Innovation 2014-2020, The Research Sectorial Plan of the Ministry of Agriculture and Rural Development, the National Programme of Research PN II - developed by the Executive Agency for Higher Education, Research, Development and Innovation (UEFISCDI): (i) Capacity, (ii) Partnerships in priority areas and (iii) Human Resources and also, the EU Directives.

Some of the listed documents have received more weight in respondents explanation like for the National Plan for Research and Innovation 2015-2020 which acts in coordination, coherence and implementation of national policies on research and development and knowledge; the program is run by the National Authority for Scientific Research and Innovation (NASR) under the Ministry of Education and Research, having the role of synthesis and coordination in implementing the Strategy and Governance Program in scientific research, technological development and innovation. It comprises five programs: Development of the national research and development, increasing competitiveness of the Romanian economy through R & D and innovation, European and international cooperation, and Frontier and fundamental research in areas of strategic interest.

11.4 Experiences regarding connecting science to policy/practice

11.4.1 Use of knowledge

In the questionnaire based study there is recorded no standard answer for defining the scientific knowledge. Some answers were extensively given like "*Scientific knowledge can be defined as a laborious process of observation and measurement of phenomena, of accumulation and arrangement of materials, of hypothesis and patterns creation and validation through experiments, tests, assays, of acknowledgement or invalidation of hypothesis, of issuing the obtained results so that they can be validated, of modification or development of the model according to the obtained practical results and the final users opinions*" or very short like "*An explicit undertaking to reach a précised task".*

Most commonly scientific knowledge is seen as "*An assembly of ideas, hypothesis, issues, verified through studies and experiences which lead to a new model for solving theoretical and practical issues and the emergence of new ideas and outputs"* or "*An assembly of ideas, hypothesis, theories, issues, which through different studies and trials may become technologies, new or improved products, contributing to theoretical and practical progress*" or "*A knowledge pool filled in time through experiences, hypothesis and scientific based theories".*

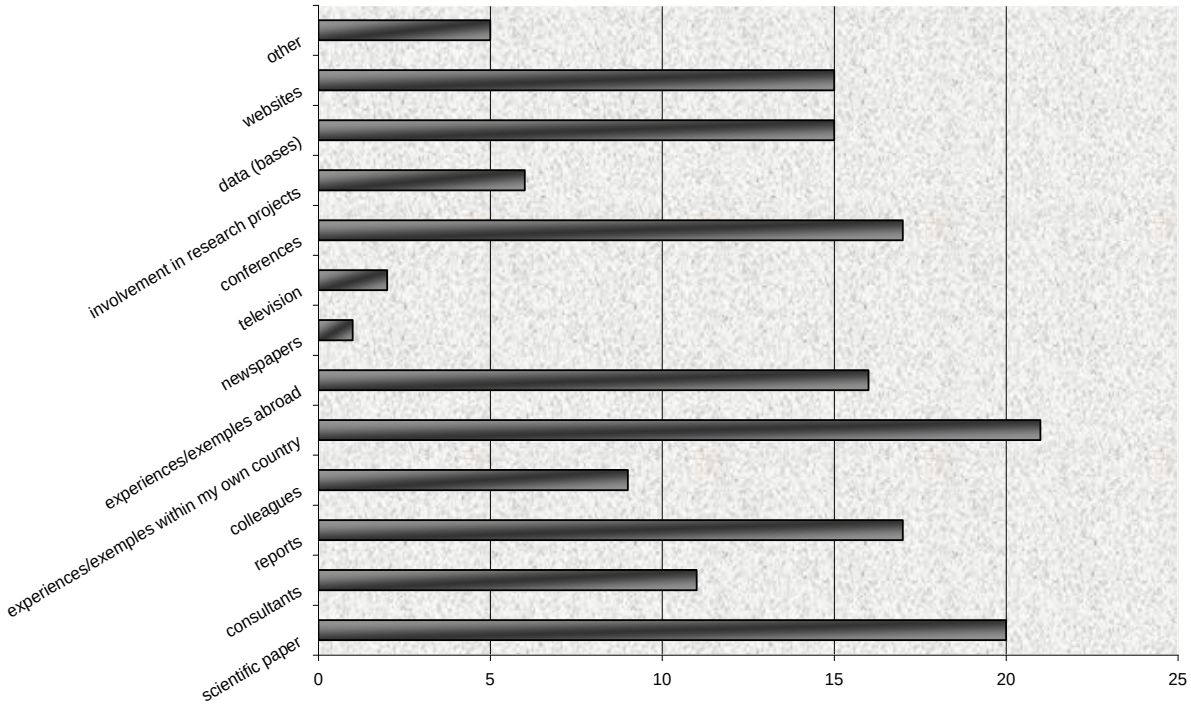
The most acknowledged scientific sources are "*experiences/examples within my own country"* (95% of respondents) and "*scientific paper" (90% of the respondents). "Television"* and *"newspapers"* are the lowest ranked. The last two options were ticked by farmers, suggesting a potential very low impact of the national agricultural advisory services.

Scientific knowledge is used for a deeper development of the own professional expertise skills, to the development of knowledge base specific to the own professional needs or to collect, cumulate and analyze information for resolving an issue and/or develop some research topics.

The most recent/new scientific knowledge is used in a significant extent, the most common answer being "*As much as it is possible, related to the needs*" or "*As much as possible, for a successful research and education performance".*

The extent of the use of the most recent scientific research for the formulation of the existing policies ranges wide from not having knowledge of the issue to a medium or significant extent.

RO answers weight (nr.) to question ,, Which sourses of (scientific) knowlwdge do you use for doing your job?"

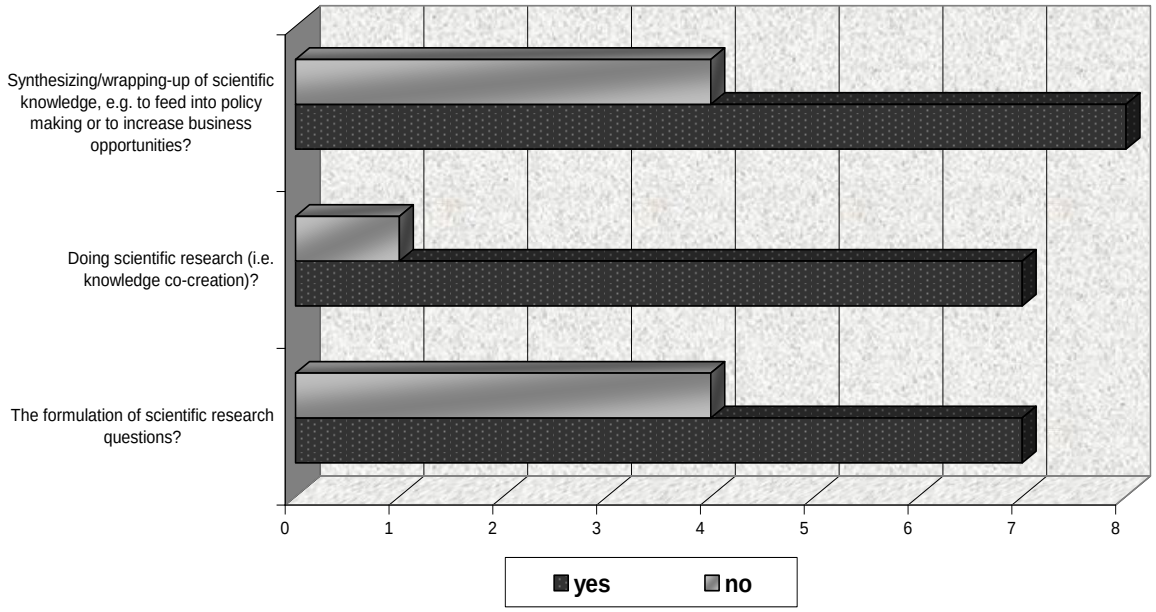


11.4.2 Possibilities to set the agenda

Generally, the capacity of the respondents to influence the setting of scientific research policies/agendas in the country is low.

Few respondents were involved in “doing scientific research”.

RO answers weight (number) to the question ,, have you ever been involved in:"



The answer to the question *"To which extend do our national policies/agendas reflect your specific needs and priorities?"* is somehow split in different views but frequently, the respondents make an immediate connection with EU Directives in answers like *"Our national agendas mirror the specific needs and priorities in the field of genetic plant improvement and the enforcement of the European Directives"* and *"The agenda mirrors the requests set by EU Directives; whether soil and sediments topics should be considered and get funded, an European Directive on soils should also be set"* or comments like *"The enforcement of the EC Directives, with regard to environment and agriculture, should take into account the national specific of the traditional practices maintenance as well as to the shaping of research requirements to bring the agricultural performance and environment preservation to the level of the international standards".*

11.4.3 Science – policy – practice

The societal impact of scientific research related to the scope of INSPIRATION is commonly assessed ranging from neutral to very satisfactory but the option "*Very successful/satisfying"* is the most ticked. Some respondents see for a prospective improvement that "*SRA agenda should be applied in all MS, not only in the developed MS"* and "*The widening of the gap in terms of research, between different MS"* should be avoided. Also a Soil Directive and a European Research Program for SSW system is seen as very much needed.

When conecting the content of discussions held in the National Workshop held in September 2015 with the results of the questionnaire based study, the following top of the the most important national Science-Policy-Interface documents came up:

I. National Strategy for Research, Development and Innovation 2014-2020;
II. National Rural Development Program 2014 – 2020;
III. Strategy for the agri-food sector medium and long term development – horizon 2020/2030.

The National Strategy for Research, Development and Innovation 2014-2020 states that *"environment protection is a priority of any present policy with regard to the massive investments that have to be pursued in recycling and de-pollution techniques and in water bodies and wetlands management*." Moreover, "*the agri-food products safety and optimization, development of the horticultural, forestry, husbandry and fishery sectors or the better use of biomass and bio-fuels represent sub-domains with a clear potential*."

The sustainable management of the natural resources is also a priority of the Strategy for rural development 2014-2020 in the National Rural Development Program for the 2014 – 2020 period as well as the Strategy for the agri-food sector medium and long term development – horizon 2020/2030 drafted by the Ministry of Agriculture and Rural Development. The country needs identified by these documents refer to the maintaining the biological diversity and environmental value of agricultural and forestry lands, maintaining and improving water resources, protecting and improving soil resources, adaptation to the effects of climate change, lowering the level of greenhouse gase (GHG) emissions from agriculture and the transition towards a low carbon economy.

11.5 National and transnational funding schemes

11.5.1 Funding schemes and possibilities for research funding

To the question "*Which experiences and expectations in funding schemes (public / private) do you have in your own field that could offer opportunities for future research on land-use and - management and related impacts to Soil-/Sediment-/Water-systems",* the majority of respondents have chosen to tick "Nationally"" and "European".

The increase of the added value of different financial resources is seen to be done by some respondents by setting multi-disciplinary consortiums, increase the level of expertise of the research teams, increase performance of the funding through an optimal use of resources, encourage the research staff to increase its personal value, improvement of the stability and predictability of the financial sources at European and national level.

Some respondents think that the relation soli-sediments-water may be studied locally, regionally and national, as there are specific local features of this relationship. They also see that all the results will be analyzed at EU level and then EU will synthesize the conclusions and draw a document applicable in all MS. If we seek for a fair use of resources, the huge differences between MS should be leveled. The destruction of the national research network in some less developed countries fuels higher differences between MS and lower the value of the index of resources use. Equalizing the rate of development in this field will induce leveling the analyze methods, assessments and interpretation of results which finally lead to an increased efficiency of the financial resources. A scientific sound assessment of the results will lead to a multiplication of the area of application, thus to an increased economic efficiency.

In Romania, over 60% of the agricultural land is used by subsistence farmers. If the soil and agro-chemical surveys are done at commune level, the price will be times lower as at farm level. Here, the investment should be done by the State. Without a proper legislation, neither the large farmers (which in fact are tenants) are interested in the evolution of the soil quality; they look only to the profit increase. They are never interested in studies. For farmers, the relation agriculture-environment is not an interesting topic. There are no funds available for such issues and if there are, these are very, very scarce.

The take up and use of knowledge resulting from execution of the SRA is seen by respondents as *"neutral",* on the average. Lots of critic views were shared by respondents that tempted to be rather skeptical. Research in Romania is done mostly based on former and aged results; there are no private investors in research. New scientific findings are brought by the multinational companies, which have no interest to support the research in Romania. Only the State can support the national research costs. The multitude of existing foreign farmers is provided with research outputs from their own countries, they show no interest for soil as an environment factor but they treat soil like a commodity and a capital good. There is no a significant experience in Romania regarding private donors. Between 1995-2000, when this has been tried, lot of research entities collapsed and have been closed. Practically, there are no private donors, nor the legislation has a clear frame on this issue. The societal demands cannot be met either then through the national budget intervention, as more than 60% of the Romanian agriculture is a subsistent one and the large sized farms are in direct connection with multinational companies. Romanian capital is short, so is the interest for such a research field. The SSW field does not benefit of private funding for research. Also,

hardly national funds are involved and extremely rare, international ones. Without the issue of a Soil Directive or a legal framework for SSW as well as a core funding from National Plan for Rural Development, there is no way to progress, at least in Romania.The potential investors need to be convinced that funds allocation for SSW research will turn, among the environment protection, to economic benefits.

11.5.2 Gaps in financial resources for research

The majority of respondents of the questionnaire based study agreed with the fact that a significant number of areas of research and innovation (R&I) are not (yet) covered by current funding mechanisms.

Little attention is given to the soil issues, with particular emphasize to water and plant relationship. With regard to the sediment, there is no interest recorded at all. There are also some other topics overlooked, like conservation agriculture technologies, nutrients management, soil quality monitoring at large scale, Green House gases emissions or even the training of the soil scientists. The inexistence of an EU Directive for Soil and Soil protection hampers the funding for fundamental and applied research in soil science and the awareness and priority given to the soil importance is low. In Romania, the research thematic area regarding soil was dropped from the National Research Plan.

Regarding integrated approaches, the respondents view as some improvements the EU support, like the one for Rural Development, and request for Directives which may set certain conformities to be complied in terms of research not only for reporting. Whether a Soil Directive or a clear legal frame at EU level would be in place, maybe the Romanian leaders will understand the importance of the relation soil-sediment-water. For the water, the things are much clear because of the existence of a Common regulatory framework. There is less interest and consideration for soil and sediment. A higher awareness degree is seen as needed among the direct target groups, regarding the benefits of the environmental friendly practices.

There are also recorded issues raised by the participants in the National Workshop held in Agigea, Constanta:

- Lack of a coherent legislation in the field of soils, at national and European level;
- Lack of a research strategy in Romania concerning SSW;
- Continuous low funding (beneath the real needs) of the research entities with soil expertise;
- Low concerns on the development of urban spatial planning, landscape design and land management;
- No real prospects can be envisaged since there are no plans on short, medium and long term;
- An abrupt increase of the agricultural land purchased by foreign companies and foreign private holders (over 40% of the total UAA, out of which 10% non-EU holders);
- Big holdings managers' lack of interest about the soil quality and its evolution;
- An insufficient cooperation between researchers and farmers;

- Low access to specialized information due to the scarce availability of agricultural reviews; most of the professors and researchers submit articles for ISI indexed reviews (written in English), farmers hardly can access this kind of information.

The participants discussed also about the research financial sources. Under the present circumstances with no clear European legislation regarding soils, the only sources rely on the Ministry of Agriculture and Rural Development, the Ministry of Education and Research and in a lesser extent Ministry of Environment, Waters and Forestry (rather on contractual basis then thorough periodically competition based grants).

There are no regional funding options. The external (international or European) funding has low values and the national private options are close to zero.

11.6 Other remarks made by interviewees

Related to question nr. 9, an interesting point came from a ministerial representative: "*Scientists, professors, civil servants, farmers, holding owners are always invited when drafting the development strategies and the national plans. Unfortunately, less are those with soil expertise due to the low number of soil profiled organizations. Therefore, the number of proposals regarding soil topics is limited, and no priority can be given to them. Most usually, in Romania, the research topics are simply copied from EC, little we can influence these topics which sometime are unfit with the national conditions and issues".*

11.7 Annexes

Annex I: NKS interviews in Romania

Date of the interview	Name of the entity	Contact person	funder	end user	knowledge provider	national-regional-local authority	university/ research insitute	SME /consultant	business and industry	NGO	network	other	soil	sediment	water	land use-management
5/10/2015	Ministry of Environment and Climate Change	Istrate Gabriela	1			1							1	1	1	
12/9/2015	Romanian Farmers Association	Popescu Oprea Adelina		1							1					1
N.a.	Romanian National Institute of Marine Geology and Geoecology-GeoEcoMar	Stanica Adrian			1			1						1	1	
5/10/2015	University of Agronomic Science and Veterinary Medicine - Bucureşti	Mihalache Mircea			1		1						1			1
5/10/2015	University of Agronomic Science and Veterinary Medicine - Bucureşti	Ilie Leonard			1		1						1			1
10/9/2015	University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca	Paulette Laura			1		1						1			1
11/9/2015	University POLITEHNICA of Bucharest	Constantin Carolina			1		1						1		1	
12/9/2015	Ministry of Agriculture and Rural Development	Morarescu Viorel	1			1							1		1	1
12/9/2015	Ministry of Agriculture and Rural Development	Tatomir Elena	1			1							1		1	1
1/10/2015	Ministry of Education and Sciences	Dinu Iuliana	1			1							1			
1/10/2015	Ministry of Education and Sciences	Soriga Iuliana	1			1									1	
8/10/2015	Soil Testing Laboratory Timis	Tarau Dorin		1							1		1			1

12/9/2015	Soil Testing Laboratory Gorj	Craioveanu Gheorghe		1							1		1		1
5/10/2015	Soil Testing Laboratory Gorj	Creanga Ion		1							1		1		1
6/10/2015	Association of Cereals and Oleaginous Crops Producers	Lamureanu Gheorghe		1					1						1
12/9/2015	AGROLIFE	Vasile Nicu		1					1				1		1
2/11/2015	AGROFAM HOLDING SRL	Poenaru Stefan		1					1						1
24/09/2015	Romanian National Society of Soil Science	Toti Mihai			1					1			1		1
13/09/2015	Agricost SRL	Buzdugan Lucian		1					1				1	1	1
8/10/2015	Politehnica University of Timisoara	Rogobete Gheorghe			1		1						1	1	1
23/09/2015	National Research and Development Institute for Soil Science, Agro-chemistry and Environment - ICPA Bucharest	Vranceanu Andrei			1		1						1		1
10/11/2015	The Academy of Agriculture and Foresty Sciences	Jelev Ioan			1		1							1	1
6/10/2015	Farmer, Agigea	Banu Ionica		1					1						1
			5	**9**	**9**	**5**	**7**	**1**	**5**	**1**	**4**	**0**	**16**	**4**	**9**	**17**

Annex II: Documents used for the RO desk study

Anuarul Statistic al Romaniei (2014), Institutul National de Statistica (Romanian Statistical Yearbook).

Ministerul Agriculturii si Dezvoltarii Rurale, Directia Generala de Dezvoltare Rurala (2015), Programul National de Dezvoltare Rurala pentru perioada 2014-2020, versiunea aprobata 26.05.2015 (National Rural Development Program for the 2014 – 2020 period, 26.05.2015), http://www.madr.ro/

Ministerul Educatiei Nationale si Cercetarii Stiintifice (2014), Strategia naţională de cercetare, dezvoltare şi inovare 2014-2020, Hotărârea nr. 929/2014 (Guvernul României), publicată în Monitorul Oficial, Partea I, nr. 785 din 28.10.2014 (The National Strategy for Research, Development and Innovation 2014-2020), http://www.research.ro/ro/articol/3343/strategia-nationala-de-cercetare-si-inovare-2014-2020

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Annex III: Romanian R&I funding options

R&I funding options collated for country:	Romania	(Fill out your country name in this box)

	Name*	**Research and Innovation funder****	**What and/or whom do they fund?*****	**More info******
Regional				
1				There is no regional funding identified.
National				
1	Programe Nucleu (Core Programs)	Ministerul Educatiei Nationale si Cercetarii Stiintifice, Autoritatea Nationala pentru Cercetare Stiintifica si Inovare (Ministry of National Education and Research, National Autority for Research and Innovation)	Research institutions of public right (legal entities)	http://www.research.ro/ro/articol/3768/programe-na-ionale-programe-nucleu
2	Planul Sectorial pentru cercetare-dezvoltare din domeniul agricol si de dezvoltare rurala (Sectorial Plan), ADER 2020	Ministerul Agriculturii si Dezvoltarii Rurale (Ministry of Agriculture and Rural Development)	Juridical research and development entities/research and development authorised individuals	http://www.madr.ro/cercetare-inovare.html
3	Planul National de Cercetare-Dezvoltare si Inovare pentru perioada 2014-2020 (National Plan for Research, Development and innovation), PNCDI III	UEFSCDI, Ministerul Educatiei Nationale si Cercetarii Stiintifice (UEFSCDI, Ministry of National Education and Research)	Parnerships of research institutions of public right, universities, SME and/or LE, NGOs, legal professional associations	http://uefiscdi.gov.ro/articole/4270/Programe-PNCDI-III.html
4	Planul National de Dezvoltare Rurala 2014-2020, Masura 16, Cooperare (Rural Development National Plan 2014-2020, Measure 16, Cooperation, compling with Art 35 of the Regulation (UE) nr. 1305/2013)	Ministerul Agriculturii si Dezvoltarii Rurale (Ministry of Agriculture and Rural Development)	Operational groups (research entities/farmers/farmers' groups/cooperatives/advisors/private enterprises/NGOs)	Arrangements in progress (still to be open)

* Include full name and (if available) acronym of the R&I funding option

** Include name of the R&I funder/funding institute or authority

*** Detail which type of programme, projects, partners or infrastructures they are funding

**** Include weblink and/or other reference for more information on this R&I funding option

12. Slovakia

Report by Maros Finka, Maria Kozova, Zita Izakovicova, Lubomir Jamecny, Vladimir Ondrejicka

12.1 Executive summary

12.1.1 English version

Societal challenges

Dominant challenges in regard to the land/soil management topic appointed by the reviewed national key stakeholders (NKSs) from Slovakia were to contribute to healthy living environment and to the food safety, to participate to climate change effects lowering and social adaptation, to safeguard safe delivery of drinking water, to decrease the consumption of natural resources and to contribute to the efficient use of natural resources.

These challenges identified in the interviews were discussed on 3 national workshops as well. The participants underlined interlinks among the challenges and necessity to deal with them in an integrative way. All above listed topics are in the harmony with the Research and Innovation Strategy for Intelligent Specialisation of the Slovak Republic (RIS3 SK) containing the research priorities for Slovak Republic up to 2020. Among them the topics related to the environment protection, use of natural resources, clean energy e.g. efficiently usable energy resources and environment, agriculture, food safety.

In addition some alternative challenges/topics, deepening above listed societal challenges/topics have been identified e.g. protection of agricultural soil against urbanization and degradation, efficient use of soil (agricultural, forest) and development of sustainable soil management reflecting potentials and limits in the use of soil as well as balance between economic and environmental interests, integration of the soil-water-land management with the link to ecosystem services and stress on their implementation in the practice and on their benefits / underline the economic dimension as well, implementation of preventive measures for soil – water – land protection tackling the danger of natural disasters (not only climate change), revitalisation of degraded ecosystems and brownfields, sustainable development of cultural landscape and historic landscape structures and others.

As a common problem was appointed by many NKSs – the topic “land-soil-water-sediments” needs systematic research (e.g. monitoring, long term effects assessment after the implementation of respective intervention) and not only set of short-term projects as it is reality across the levels incl. EU level. In many cases the research is more reacting on pressing problems than preparing the background for systematic prevention oriented measures.

R&I priority topics

Based on the contributions from the reviewed NKS and workshops outputs following issues seems to be priority for EU supported research as the part of SRA:

- Sustainability and sustainable management of natural resources – optimization of soil functions incl. approaches, methods and instruments of the productive land protection against its transformation towards build-up areas, intensive and ecologic acceptable production approaches in agricultural and forest country, the effect of ownership transformation in the land management, harmonization of the methods, structure of the data.
- Improvement of the reflection of scientific knowledge into institutional instruments of land management incl. economic instruments incl. assessment of long term policies – analyses of policies and assessment of their effects, contributions to the environmental quality, efficiency, factors of efficiency, assessment of the effects of supportive EU schemes for environment, efficiency of the financial investments, methods and indicators for the assessment of their efficiency etc.
- Sustainability of water resources and of quality of water management services incl. assessment of global (incl. climatic) and regional factors influencing the development of water balance in the territory and predicting of environmental and economic effects due the proposed/implemented measures.
- Approaches, methods and instruments of the lowering and elimination of natural hazards and risks (floods, forest calamites, forest fires, geodynamic hazards and erosion) incl. risk assessment on land use/soil use in relation the quality of water, risk assessment on drought and foods as the effects of climate change and anthropic changes in the landscape, development of the mitigation measures to lower abiotic and biotic damages on forest
- Risk assessment in regard to land use effects on the quality of natural resources incl. research on changes in the landscape, spatial optimalisation of the land use, ecologic optimal functional landscape organization, development of the model of integrated landscape management, strategic assessment of the quality and efficient use of landscape, etc.
- Mapping and assessment of natural capital, mapping, assessment and revitalization of degraded landscape ecosystems and the landscape ability to provide ecosystem services incl. mapping and assessment of landscape and biotopes` fragmentation, approaches, methods and instruments for revitalisation of degraded landscape ecosystems incl. brownfields and for efficient implementation of the ecosystem services concept, etc.

- Lowering of negative effects of urbanization, urban sprawl regulation, consequent monitoring of industrial production effects incl. approaches, methods and Instruments: of assessment of urban sprawl and its limitation and mitigation of negative effects, of green infrastructure revitalisation, development and maintenance, of identification of complex caring capacity of urban landscape and for monitoring and provision of the data on environmental quality incl. the risks accessible for all stakeholders in real time, of lowering and prevention of the negative impacts on human health.
- Modelling of the global megatrends effects. In the context of global economic, social and environmental interlinks, global competition, global effects like biodiversity degradation, not efficient use of natural resources, climate changes special attention should be payed to the 11 megatrends listed by EEA in 5 clusters decision making for long-term perspective in European environment
- Restoration of contaminated soils by heavy metals and organic pollutants as a consequence of anthropogenic activities - using of agricultural soils and novel approaches of intensification of agriculture focusing on healthy food and higher demand for organic products is necessary to increase the quality of ecological soil functions.

Science-policy-interface

Positive experience regarding the interface between science and policies was identified in the case of environmental policy in 1990-2006 where the transfer from science toward the practice was rather successful (e.g. landscape planning in the building code, in the act of nature and landscape protection, territorial systems of ecologic stability as a part of land consolidation plans, methodologies for landscape planning documentations, new law on EIA/SEA and methodologies in this field, sustainable development strategies at national, regional and local levels, Strategy for biodiversity protection and its Action plan...). National strategy for sustainable development was fully in the hands of professionals, as well as the development of Regional and Local Agenda documents was broadly supported by the scientists in many cases in the position of activists. As the problem was appointed their implementation efficiency, many of measures based on newest knowledge has not been implemented in the practice. The same for Biodiversity Protection Strategy and its Action Plan. In global, national strategies/agendas do not mirror specific needs of academic community in a proper way, in many cases their adoption is only formal with no practical effects, and the measures are moved from year to year, from document to document. Slovak Republic has got many of documents elaborated on high professional level, but their implementation is formal, the realisation of the included measures use to be moved from year to year, many of them ignored and stay only in the declarative position. Many of documents are elaborated only as they are required by international agreements. The policies are influenced by lobbing and interests of specific interest groups.

Funding options

There are different sources national and international used as the sources for financing the research in Slovakia. Most important financial resources are represented by:

- Resources from local and regional authorities.
- National resources KEGA, VEGA, APVV, sectoral ministries.
- European, H2020, Interreg, Norway fund, Swiss fund, Life, URBACT, V4 fund.
- International Future Earth, MAB UNESCO, IPBES.

As the international sources are very competitive and connected with huge administrative load of work, big pressure is at the national level of grant schemes, but the amount of finances in national schemes is very low and the grants do not allow serious research in (time and sources requiring projects) the field of living environment, especially in the VEGA scheme. Successful realisations of the EU projects hamper administrative barriers, bureaucratic procurement processes not fitting to the scientific services or infrastructure procurement, not proper models of financing (based on hours spent and not on effects), need of co-financing e.g. in INTERREG projects as well as late reimbursement of the expenditures, discrimination of some research units in the calls (structural funds) e.g. not eligibility for researchers from Bratislava although they have the same precondition, if not worser, than others in SK. Due the international lobismus underdeveloped from Slovak representatives in Brussels Slovak researchers do not have the same access to the H2020 and other European schemes.

12.1.2 Slovak version

Ako hlavné výzvy vo vzťahu k problematike manažmentu územia a pôdy z pohľadu slovenských kľúčových stakeholderov boli označené: prispievať k zdravému životnému prostrediu a k potravinovej bezpečnosti a bezpečnosti potravín, participovať na zmierňovaní klimatických zmien a sociálne prispôsobenie, zaistiť bezpečné dodávky pitnej vody, ochrana vôd, znížiť spotrebu primárnych surovín a zdrojov, zabezpečiť efektívneho využívania prírodných zdrojov.

Tieto výzvy identifikované v rámci interview, boli diskutované aj na troch národných workshopoch. Ich účastníci podčiarkli vzájomné väzby medzi výzvami a potrebu k nim pristupovať integrovane. Uvedené výskumné témy sú plne v súlade so Stratégiou výskumu a inovácií pre inteligentnú špecializáciu SR. RIS3 SK obsahuje výskumné priority a oblasti špecializácie SR do roku 2020 pričom ich súčasťou sú aj priority zamerané na ochranu životného prostredia, využívanie prírodných zdrojov, čistú energiu, napr. efektívne využiteľné zdroje energie, životné prostredie, pôdohospodárstvo, potravinová bezpečnosť.

Okrem toho boli identifikované niektoré komplementárne výzvy ako sú napr. ochrana produktívnej a kvalitnej poľnohospodárskej pôdy pred záberom na výstavbu a pred degradáciou, efektívne využívanie pôdny (poľnohospodársky a lesný) fond, rozvoj udržateľného manažmentu pôdy rešpektujúc potenciály a ohraničenia využívania pôd ako riešenie balansu medzi ekonomickými záujmami a životným prostredím, riešenie problému pôdy - vody – územia v integrovanom manažmente s väzbou na poskytovanie ekosystémových služieb; ekosystémové služby posunúť do praxe s dôrazom na ich benefity (zadefinovať to aj ako ekonomickú tému), realizácia preventívnych opatrení na ochranu pôdy – vody - územia pred prírodnými hrozbami a rizikami – treba sledovať aj ďalšie environmentálne problémy, nielen klimatickú zmenu, revitalizovať degradované ekosystémy a hnedé plochy sídiel, zachovanie kvalít kultúrnej krajiny a historických štruktúr krajiny a iné. Ako spoločný problém menovaný mnohými národnými kľúčovými stakeholdermi možno označiť potrebu systematického výskumu v rámci témy “územie-pôda-voda-sedimenty” napr. monitoring, hodnotenie dlhodobých efektov po implementácii intervencií) a nie iba realizáciu krátkodobých projektov ako je to skutočnosť naprieč rôznymi úrovňami EU. V mnohých prípadoch výskum skôr reaguje na urgentné problémy ako by pripravoval systematické východiská pre preventívne orientované opatrenia.

Prioritné témy pre výskum a vývoj

Vychádzajúc z príspevkov kľúčových národných stakeholderov a výstupov workshopov nasledujúce témy sa javia byť prioritami pre výskum podporovaný EU ako súčasť strategickej agendy výskumu (SRA):

- **Zachovanie a udržateľný manažment pôdnych zdrojov – optimalizácia funkcií pôd vrátane p**rístupy, metódy a nástroje ochrany produktívnej a kvalitnej pôdy pred záberom na výstavbu, intenzívne a ekologicky prijateľné pestovateľské postupy v poľnohospodárskej a lesnej krajine vrátane aspektov krajino-tvorby, vplyv transformácie vlastníckych vzťahov a zabezpečenie prístupu k informáciám o pôde a aktualizácia pôdneho prieskumu a zberu údajov a iné.
- **Zlepšenie priemetu vedeckých poznatkov do inštitucionálnych nástrojov manažmentu - právne a ekonomické nástroje vrátane h**odnotenia dlhodobých reálnych dopadov, hodnotenia dopadu podporných schém na životné prostredie, hodnotenia transferu vedeckých poznatkov do environmentálnej praxe
- **Udržateľnosť vodných zdrojov a kvality poskytovaných vodohospodárskych služieb vrátane h**odnotenia globálnych (klimatických) a regionálnych/lokálnych vplyvov (antropických) na vývoj vodnej bilancie v území a predikcia environmentálnych a ekonomických efektov v dôsledku navrhovaných/prijatých opatrení.
- **Prístupy, metódy a nástroje na zmierňovanie a elimináciu prírodných hazardov a rizík (povodní, kalamít v lesoch, nebezpečenstva požiarov v lesoch, zosuvná a erózna činnosť…)**vrátane hodnotenia rizík využívania pôdy/krajiny s ohľadom na kvalitu vôd, hodnotenia rizík nedostatku/sucha a nadbytku vody (záplavy) v dôsledku klimatickej zmeny a antropických činností v krajín, opatrní na zníženie abiotického a biotického poškodenia lesov (vetrové a kôrovcove kalamity) a i.
- **Hodnotenie rizík využívania pôdy/krajiny s ohľadom na kvalitu jednotlivých prírodných zdrojov vrátane v**ýskumu zmien krajiny a priestorovej optimalizácii využívania krajiny, ekologicky optimálna organizácia a využitie krajiny, rozpracovania modelu integrovaného manažmentu krajiny založeného na systémovom prístupe ku krajine ako integrácie prírodných zdrojov v určitom priestore, strategického posúdenia kvality a efektívneho využívania krajiny, jej zaťaženia, potenciálov a environmentálnych limitov
- **Mapovanie a hodnotenie prírodného kapitálu, mapovanie, hodnotenie a revitalizácia degradovaných ekosystémov krajiny a schopnosti krajiny poskytovať ekosystémové služby** vrátane mapovania a hodnotenia fragmentácie krajiny a biotopov, osobitne v urbanizovanej krajine and hodnotenie biodiverzity v urbánnej krajine, metódy jej ochrany a revitalizácie, prístupy, metódy a nástroje: revitalizácie degradovaných ekosystémov v krajine vrátane brownfieldov, implementácie konceptu ekosystémových služieb do praxe, manažmentu krajiny vrátane územného plánovania s dôrazom na ich benefity a i.

- **Znižovanie negatívnych vplyvov urbanizácie, regulovanie rozrastania sídiel do krajiny a dôsledné sledovanie dopadov priemyselnej výroby h**odnotenia dôsledkov rozširovania urbanizácie do prírodnej a poloprírodnej krajiny - rozrastanie sídiel do krajiny, nástroje jeho obmedzovania a znižovania negatívnych efektov, prístupov, metód a nástrojov tvorby, obnovy a údržby zelenej infraštruktúry a i.
- **Modelovanie vplyvu globálnych mega-trendov.** Slovensko podobne ako i Európa je previazané so svetom prostredníctvom rôznych ekonomických a sociálnych väzieb, ktoré umožňujú obojsmerný tok materiálov, finančných zdrojov, inovácií, ideí, ale aj odpadov a emisií. Zvyšuje sa globálna súťaž o zdroje a zároveň sa prejavujú dôsledky globálnych javov ako je úbytok biodiverzity, neefektívne využívanie prírodných zdrojov, zmena klímy a pod. V dôsledku toho bude ekologická, ekonomická a sociálna situácia Európy a teda aj Slovenska v nadchádzajúcich desaťročiach výrazné ovplyvnená rôznymi globálnymi megatrendmi. Tie možno definovať ako trendy vo veľkom meradle (globálne) s veľkými dopadmi; často ide o vzájomne závislé sociálne, ekonomické, politické, environmentálne, alebo technologické zmeny. Európska environmentálna agentúra (EEA) definuje 11 megatrendov (MT) v piatich klastroch, ktoré sú považované za kľúčové pre dlhodobý výhľad v oblasti životného prostredia v Európe. Je potrebné neustále sledovanie týchto megatrendov, modelovanie dopadu týchto megatrendov na krajinu, jej zložky a prvky.
- **Obnova pôd znečistených ťažkými kovmi a organickými polutantmi ako dôsledok antropogénnych činností vrátane i**dentifikácie a kvantifikácie antropogénnych faktorov, hodnotenia možnosti uplatnenia nevyužívanej pôdy na poľnohospodárske činnosti, vypracovania vhodných opatrení pre efektívny manažment ekologického hospodárenia na pôde ako aj postupov renaturácie poškodených pôdnych systémov (ťažkými kovmi, pesticídmi, zasolené pôdy atď.).

Vzťah veda a politika

Ako príklad úspešného prenosu vedeckých poznatkov je do politiky je možné označiť obdobie rokov 2000-2006, kde sa podarilo dostať viaceré vedecké poznatky do tvorby legislatívy (krajinnoekologický plán do stavebného zákona, ÚSES do pozemkových úprav a do, zákona o ochrane prírody, metodiky pre tvorbu krajinnoekologických dokumentácií do vyhlášok a pod.). Podobne na tvorbe zákonov E.I.A a S.E.A sa podstatnou mierou podieľala vedecká komunita. Výrazná participácia vedeckých pracovníkov bola v oblasti implementácie trvalo udržateľného rozvoja. Národná stratégia trvalo udržateľného rozvoja bola výlučne v rukách odborníkov, podobne ako aj spracovanie Regionálnych a Lokálnych Agiend prebiehalo väčšinou pod gesciou vedcov, prípadne za ich širokej účasti ako aktivistov. Problém však je, že tieto opatrenia sa už slabšie, alebo vôbec nerealizujú a neaplikujú v praxi. Podobná situácia bola aj pri spracovaní Stratégie ochrany biodiverzity a jej Akčného plánu. Žiaľ vo všeobecnosti národné politiky/agendy odzrkadľujú špecifické potreby a priority vedeckej komunity nedostatočne. Často krát prijímanie týchto strategických dokumentov je len formálne. SR má síce vypracované strategické dokumenty na dobrej odbornej úrovni, ich realizácia v praxi je minimálna, realizácia opatrení zadefinovaných v jednotlivých dokumentoch sa často posúva z roka na rok, mnohé opatrenia sa prepisujú

z jedného dokumentu do druhého, mnohé z nich sa ignorujú a často tieto opatrenia zostávajú deklarované len v týchto dokumentoch. Mnohé dokumenty sa vypracovávajú iba preto, lebo si to vyžadujú medzinárodné záväzky. Tvorba politík je často ovplyvňovaná aj politikou a výrazným lobingom rôznych záujmových skupín.

Na financovanie výskumu sa v SR používajú rôzne zdroje, či už národné alebo medzinárodné. K najvýznamnejším patria nasledovné zdroje a fondy:

- Vnútroštátne / regionálne: zdroje Samosprávnych krajov, zdroje miestnych samospráv.
- Národné: VEGA, KEGA, APVV, príslušné ministerstvá.
- Európske: H2020, Interreg, multilaterálne, cezhraničná kooperácia, Vyšehradsky fond, Nórsky a Švajčiarsky fond, Life, URBACT.
- Medzinárodné: Future Earth, MAB UNESCO, IPBES.

Vzhľadom na ťažkú dostupnosť finančných zdrojov z medzinárodných grantových schém a ich administratívnu náročnosť, veľké tlaky sú vyvíjané na domáce grantové schémy, čo následne spôsobuje slabú úspešnosť projektov v grantových schémach. Financie v národných schémach sú značne poddimenzované, najmä v grantovej schéme VEGA a často za poskytnuté finančné prostriedky nie je možné hĺbkovo riešiť problémy životného prostredia, ktoré sú častokrát finančne i časovo náročné. Úspešnú realizáciu sťažujú často aj rôzne administratívne bariéry, ako je verejné obstarávanie, nevhodné modely financovania (založené na odpočte odpracovaných hodín a nie na výsledkoch), napr. povinná spoluúčasť v projektoch INTEREG, následná refundácia výdavkov až po ukončení projektov v prípade cezhraničných projektov a pod. Problémom je aj diskriminácia niektorých pracovísk vo výzvach štrukturálnych fondov. Nelogicky z podpory je vylúčený Bratislavský región, kde je najväčšia koncentrácia vedeckých pracovníkov. Diskrimináciou je tiež nerovnomerné financovanie vedeckých pracovníkov z medzinárodného pohľadu, kde slovenskí účastníci majú za rovnaký výskum podstatne nižšie odmeny. Pri získavaní projektov HORION 2020 značnou mierou funguje aj lobizmus, v čom Slovensko ťahá za kratší koniec.

12.2 Methodology followed

This report (i.e. INSPIRATION deliverable 2.5) reports the information collated for Slovakia. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation” and in accordance with the agreed approach to the organisation of national workshops with the NKSs. In Slovakia, 50 NKS were interviewed and 3 workshops realised in different parts of Slovakia – North-East Slovakia - Ruzomberok, Middle Slovakia – Zvolen and South-West Slovakia – Bratislava and different thematic focus with the goal to collect relevant representative information from different groups of stakeholders representing different problem regions, different thematic background and of course the whole scale of positions in the land, soil, water and sediments management.

The detailed program of the workshops and an overview about the participants follows. The program reflected the fact, that the majority of the participants were informed about the INSPIRATION project based on the interviews or from info letter about the project in the annex to the invitation. To start efficient discussion the summary from the interviews was presented and opened or specific question briefly discussed. The workshops met broad interest and were background for active involvement of many of NKSs into the report preparation and reviewing.

Details on these NKS were provided in Annex I. of the deliverable D 2.4. The desk study was based on documents based on NFP knowledge as well as suggested by NKS. These are listed in Annex II. The national report is based on broad desk research, review with NKSs. Based on this the national report has been developed in Slovak language with the goal to address stakeholders for their feedback. The final version of the national report reflecting the NKSs` opinion, results from the desk research and feedback from chosen representatives of NKSs` groups was translated and edited into the final version.

The national report has been review by 11 NKSs representing whole spectrum of stakeholders, based on its draft publishing on the website of the SPECTRA CE EU as the INSPIRATION project partner and NFP at the national level.

Detailed information about national workshops

National workshop in Ružomberok

Venue: Faculty of Education, Catholic University in Ružomberok Date: October, 12th, 2015

Organizers: SPECTRA Centre of Excellence EU, Slovak University of Technology in Bratislava, Institute of Transdisciplinary Environmental Studies and Dept. of Geography, Faculty of Education, Catholic University in Ruzomberok

Agenda:

09:30 – 10:00 Registration - Welcome coffee, tea and snacks, working material for the workshop

10:00 – 10:20 Introductory words (D. **Kováč-Petrovský,** vice-dean of the Faculty of Education, Catholic University in Ružomberok)

10:20 – 10:45 Presentation of the project INSPIRATION (M. Finka, SPECTRA Centre of Excellence EU, national coordinator of the project INSPIRATION)

10:45 – 11:15 Presentation of the preliminary results obtained in the framework of interviews (M. Kozová and J. Demko, Institute of Transdisciplinary Environmental Studies, Faculty of Education, Catholic University in Ružomberok)

11:15 – 12:15 Discussion: The importance of the project for promoting regional cooperation and building partnerships (on example of the Žilina region)

12.15 – 13.00 Final discussion: formulating the priorities and needs of integrated spatial planning, land use and soil management in the EU, Slovakia, regions and suggestions for the way forward

13:00 – 14.30 Lunch together for all participants of the workshop and informal discussion

Workshop in Ružomberok focused on discussion of societal trends and research needs of integrated spatial planning, land use and management of land and the possibilities how to streamline the transfer of scientific knowledge into practice. Within the parts providing initial objectives of the project and presented the first results from the interviews. Faculty of Education CU in Ružomberok in its research also aims to obtain information on the needs and requirements of local government, local authorities, professional associations and other entities operating at the regional level.

Participants of the workshop in Ružomberok (family, name and institutions) + addition information whether he/she was also respondent of the interview

SURNAME, FIRST NAME AND WORKING POSITION	INSTITUTION	END USER/ OR KNOWLEDGE PROVIDER
Bašáry Jozef, project manager (on behalf of the first deputy mayor Michal Slašťan he represented Ružomberok city)	City Hall in Ružomberok	end user
Bednárik Ján námestník riaditeľa	Water Company in Ružomberok	end user
Borošová Daniela, professional staff member	Regional Public Health Office in Banská Bystrica	end user
Bublinec Eduard university professor	Dept. of Biology and Ecology, Faculty of Education, Catholic University in Ružomberok	knowledge provider
Černá Ľubica, university teacher	Institute of Transdisciplinary Environ. Studies, Faculty of Education, Catholic University in Ružomberok	knowledge provider
Demko Jaroslav, university teacher	Institute of Transdisciplinary Environ. Studies, Faculty of Education, Catholic University in Ružomberok	knowledge provider
Ferianc Ján, head of the Dept.	District Office in Ružomberok, , Dept. of Land and Forest	end user
Filo Milan, Ing. expert adviser	District Office in Ružomberok Dept. of the care of the environment	end user
Finka Maroš, national coordinator of the project INSPIRATION	Spectra Centrum excellence EU, Institute of Management Slovak University of Technology in Bratislave	knowledge provider
Guniš Marián main forestry adviser	District Office in Ružomberok, Dept. of Land and Forest	end user
Izakovičová Zita director of the institute	Institute of Landscape Ecology SAS in Bratislava	knowledge provider
Kováč-Petrovský Dušan vice-dean of the faculty	Faculty of Education, Catholic University in Ružomberok	knowledge provider
Kozová Mária, head of the Institute	Institute of Transdisciplinary Environ. Studies, Faculty of Education, Catholic University in Ružomberok	knowledge provider

Mackových Daniela head of the Dept.	State Geological Institute of Dionýz Štúr, Regional Centre in Banská Bystrica	knowledge provider
Machava Ján research worker	Institute of Transdisciplinary Environ. Studies, Faculty of Education, Catholic University in Ružomberok	knowledge provider
Ochodnický Marcel, research workers	Laboratory of air quality ENVItech s.r.o. (SME)	end user and also knowledge provider
Papčo Pavol, university teacher	Dept. of Geography, Faculty of Education, Catholic University in Ružomberok	knowledge provider
Pauditšová Eva, deputy head of the Dept.	Dept. of Landscape Ecology, Faculty of Natural Sciences Comenius University in Bratislava	knowledge provider
Rakytová Iveta, deputy head of the Dept.	Dept. of Geography, Faculty of Education, Catholic University in Ružomberok	knowledge provider
Staník Rastislav, professional worker (on behalf of the head of the Dept. Slámková M. he represented the institution)	Dept. of care of the city environment, Slovak Environmental Agency in Žilina	knowledge provider
Styk Ján, research worker (on behalf of the director of the Research Institute for Soil Science and Conservation of Soils in Bratislava Sobocká J. he represented the institution)	Regional branch of the Institute in Banská Bystrica	knowledge provider
Šimún Metod director of the regional branch	Regional Land Office in Liptovský Mikuláš	end user
Tomčíková Ivana, head of the Dept.	Dept. of Geography, Faculty of Education, Catholic University in Ružomberok	knowledge provider
Uhríková Katarína, head of the Dept.	District Office in Liptovský Mikuláš, Land and Forest Dept.	end user

National workshop in Bratislava

Venue: Malé kongresové centrum SAV Date: October, 8th, 2015

Organizers: SPECTRA Centre of Excellence EU, Slovak University of Technology in Bratislava, Institute of Landscape Ecology, Slovak Academy of Science, Bratislava

Agenda:

09:00 – 10:00 Registration - Welcome coffee, tea and snacks, working material for the workshop

10:00 – 10:10 Introductory words (Zita Izakovicova, director of Institute of Landscape Ecology)

10:10 – 10:40 Presentation of the project INSPIRATION (M. Finka, SPECTRA Centre of Excellence EU, national coordinator of the project INSPIRATION)

10:40 – 11:15 Presentation of the preliminary results obtained in the framework of interviews (Zita Izakovicova, director of Institute of Landscape Ecology)

11:15 – 12:15 Discussion: formulating the priorities and needs of integrated spatial planning, land use and soil management in the EU, Slovakia, regions and suggestions for the way forward

12:15 – 13.00 Catering for all participants of the workshop and informal discussion

Participants of the workshop in Bratislava (family, name and institutions)

SURNAME, FIRST NAME AND WORKING POSITION	INSTITUTION
Pauditšová Eva	Dept. of Landscape Ecology, Faculty of Natural Sciences Comenius University in Bratislava
Kozová Mária	Institute of Transdisciplinary Environ. Studies, Faculty of Education, Catholic University in Ružomberok
Finka Maroš	Spectra Centre of excellence EU, Institute of Management Slovak University of Technology in Bratislava
Luby Štefan	Institute of Physics of the Slovak Academy of Sciences, Bratislava
Izakovičová Zita	Institute of Landscape Ecology of the Slovak Academy of Sciences, Bratislava
Kalivoda Henrik	Institute of Landscape Ecology of the Slovak Academy of Sciences, Bratislava
Bujnovský Radoslav	Water Research Institute , Bratislava
Kluvánková Tatiana	SPECTRA, Centre of excellence EU, Slovak University of Technology and Slovak Academy of Sciences, Bratislava
Špulerová Jana	Institute of Landscape Ecology of the Slovak Academy of Sciences, Bratislava

Štefúnková Dagmar	Institute of Landscape Ecology of the Slovak Academy of Sciences, Bratislava
Hrnčiarová Tatiana	Institute of Landscape Ecology of the Slovak Academy of Sciences, Bratislava
Hreško Juraj	Constantine the Philospher University in Nitra
Šatalová Barbora	Institute of Landscape Ecology of the Slovak Academy of Sciences, Bratislava
Dubcová Magdaléna	Institute of Landscape Ecology of the Slovak Academy of Sciences, Bratislava
Miklósová Katarína	Institute of Landscape Ecology of the Slovak Academy of Sciences, Bratislava
Ondrejička Vladimír	Spectra Centre of excellence EU, Institute of Management Slovak University of Technology in Bratislava
Štecová Iveta	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Lehotský Milan	Institute of Geography of the Slovak Academy of Sciences, Bratislava
Pavličková Katarína	Comenius University Bratislava, Faculty of Landscape Ecology
Jurík Luboš	Slovak University of Agriculture in Nitra, Faculty of Horticulture and Landscape Engineering
Supuka Ján	Slovak University of Agriculture in Nitra, Faculty of Horticulture and Landscape Engineering

National workshop in Zvolen

Venue: Institute of Forest Ecology, SAS, Zvolen Date: October, 16, 2015

Organizers: SPECTRA Centre of Excellence EU, Slovak University of Technology in Bratislava, Institute of Forest Ecology of the Slovak Academy of Science, Zvolen

Agenda:

09:30 – 10:00 Registration - Welcome coffee, tea & snacks, working material for workshop

10:00 – 10:20 Introductory words (Jozef Vaľka, director of Institute of Forest Ecology)

10:10 – 10:45 Presentation of the project INSPIRATION (M. Finka, SPECTRA Centre of Excellence EU, national coordinator of the project INSPIRATION)

10:45 – 11:15 Presentation of the preliminary results obtained in the framework of interviews (Tatiana Kluvánková, Institute of Forest Ecology)

11:15 – 12:15 Discussion: formulating the priorities and needs of integrated spatial planning, land use and soil management in the EU, Slovakia, regions and suggestions for the way forward

12:15 – 13.00 Catering for all participants of the workshop and informal discussion

Participants of the workshop in Zvolen (family, name and institutions)

SURNAME, FIRST NAME AND WORKING POSITION	INSTITUTION
Kluvánková Tatiana	SPECTRA, Centre of excellence EU, Slovak University of Technology and Slovak Academy of Sciences, Bratislava
Vaľka Jozef	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Finka Maroš	Spectra Centre of excellence EU, Institute of Management Slovak University of Technology in Bratislava
Štecová Iveta	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Bucha Tomáš	National Forest Centre, Zvolen
Németh Ľuboš	National Forest Centre, Zvolen
Kukla Ján	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Blaženec Miroslav	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Gomoryová Erika	Faculty of Forestry, Technical University in Zvolen
Pavlenda Pavel	National Forest Centre, Zvolen
Šulek Rastislav	University in Zvolen
Minďaš Jozef	SEVŠ Skalica
Kuklová Margita	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Štupáková Petra	Slovak Academy of Sciences, Zvolen

Wengerová Leona	National Forest Centre, Zvolen
Kozová Mária	University in Ružomberok
Ditmarová Ľubica	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Brnkaľáková Stanislava	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Pôbišová Anna	National Forest Centre, Zvolen
Janík Rastislav	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Dvořáčková Katarína	Nature Protection Agendy, Slovakia
Schule Branislav	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Babicová Alena	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Sarvašová Lenka	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Víglasová Sandra	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Parák Michal	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Luptáková Eva	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Dzurenko Marek	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Hulfán Ján	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Hrošso Branislav	Institute of Forest Ecology of the Slovak Academy of Sciences, Zvolen
Schwarz Marián	FEE Tuzvo

12.3 Research and Innovation (R&I) needs

12.3.1 Societal challenges and needs

Which societal challenges do you regard as important?

Dominant challegnes in regard to the land/soil management topic appointed by the reviewed national key stakeholders (NKSs) from Slovakia were:

- to contribute to healthy living environment,
- to contribute to the food safety,
- to participate to climate change effects lowering and social adaptation,
- to safeguard safe delivery of drinking water,
- to decrease the consumption of natural resources,
- to contribute to the efficient use of natural resources.

Only very marginal part of the reviewed NKSs added among key challenges:

- to safeguard safe infrastructure,
- to safeguard energy supply and distribution.

These challenges identified in the interviews were discussed on 3 national workshops as well. The participants underlined interlinks among the challenges and necessity to deal with them in an integrative way.

All above listed topics are in the harmony with the Research and Innovation Strategy for Intelligent Specialisation of the Slovak Republic (RIS3 SK) containing the research priorities for Slovak Republic up to 2020. Among them the topics related to the environment protection, use of natural resources, clean energy e.g.:

- Efficiently usable energy resources.
- Environment, agriculture, food safety.

In addition following other issues/challenges were addressed by reviewed NKSs.

Alternative challenges/topics, deepening above listed societal challenges/topics

- Protection of agricultural soil against urbanization and degradation.
- Efficient use of soil (agricultural, forest) and development of sustainable soil management reflecting potentials and limits in the use of soil as well as balance between economic and environmental interests.
- Integration of the soil-water-land management with the link to ecosystem services and stress on their implementation in the practice and on their benefits / underline the economic dimension as well.
- Implementation of preventive measures for soil – water – land protection tackling the danger of natural disasters (not only climate change).
- The quality of surface water and groundwater for irrigation
- The quality of drinking water and the impact of sources of pollution from agricultural activities (especially nitrogen compounds and pesticides) to the quality of drinking water

- Removal of environmental loads through remediation of geological environment and water
- Lowering the negative effects of urbanisation, urban sprawl regulation, monitoring of the industrial production effects – absence of scientific knowledge on their impacts on public health.
- Implementation of the measures lowering the contamination of soil, water and other elements of environment, including the measures limiting the land degradation, sediments contamination.
- Limitation of the landscape and biotopes fragmentation, lowering the effects of the fragmentation, further development of green infrastructure.
- Revitalisation of degraded ecosystems and brownfields.
- Use of abandoned land for quick growing trees.
- Realisation of effective environmental education and growth of social awareness.
- Sustainable development of cultural landscape and historic landscape structures.
- R&D in the field of plastic materials with the stress on recycling and bio-degradation.

Supplementing alternative important challenges linked to the land/soil management (not properly reflected in Slovakia for longer time)

- Soil ownership transformation, necessity to implement the land consolidation.
- Research capacity building at the national and regional level with relevant scientific profile for soil, water, and land management.
- Systematic state support for research-practice cooperation including technology transfer related to the land – soil – water issues.
- Access to the information, up-date of the information, and increasing the level of detail harmonisation of scientific assessment methods related to land and soil.
- Integrated information system about elements and factors of environment usable for self-government and local state governmental bodies.
- For self-government and local state governmental bodies to develop measures of soil protection for an effective territorial development.
- Redevelopment of the practical education on agriculture in the primary and secondary schools as the tool of redevelopment of the awareness about value and relationship to the soil.

A common problem was appointed by many NKSs – the topic “land-soil-water-sediments” needs systematic research (e.g. monitoring, long term effects assessment after the implementation of respective intervention) and not only set of short-term projects as it is reality across the levels incl. EU level. In many cases the research is more reacting on pressing problems than preparing the background for systematic prevention oriented measures.

12.3.2 Topics / research needs to include in the SRA

Based on the contributions from the reviewed NKS and workshops outputs following issues seems to be priority for EU supported research as the part of SRA:

SR-1: Sustainability and sustainable management of natural resources – optimization of soil functions

Despite broad available knowledge the research focused on update and practical efficient respond on current challenges is needed. This research has to be integrative across different disciplines as a precondition for overstepping the limits of sectoral approaches.

Natural capital

- Research on and development of intensive and ecologic acceptable production approaches in agricultural and forest country including the aspects of cultural landscape quality development

Land management

- Approaches, methods and instruments of the productive land protection against its transformation towards build-up areas.
- The effect of ownership transformation in the land management (specific Slovak issue)
- Access to the information about land, soil including up-date of information systems and their content, harmonization of the methods, structure of the data.

Why and for whom is this relevant topic? What aspects are parts of the issue?

This topic, although locally based has transnational and transdisciplinary dimension. The absence of proper responds on current challenges would have trans generation effects.

SR-2: Improvement of the reflection of scientific knowledge into institutional instruments of land management incl. economic instruments

Although, there is joint environmental policy in the EU, a lot of agreements, strategies and supportive schemes, but the state of art of the environment is not satisfying. The question is, where is the problem, to which extend are the policies and schemes effective, where are barriers and problems with their implementation, how can be the problems eliminated. This should be the object of the research as well addressing following topics:

Land management

- Transfer of knowledge into environmental practice, assessment, mechanisms, transfer barriers in reaction to the fact, that the scientific knowledge, providing the notions about the dangerous development is not reflected in the policies op to the moment of disasters and not rewardable changes. The question is where are barriers for transfer of know how into the policies and strategies, and which measures can support barrier less transfer.

Net impacts

- Assessment of long term policies – analyses of policies and assessment of their effects, contributions to the environmental quality, efficiency, factors of efficiency.
- Assessment of the effects of supportive EU schemes for environment, efficiency of the financial investments, methods and indicators for the assessment of their efficiency.

Why and for whom is this relevant topic? What aspects are parts of the issue?

The subjects addressed are all levels of responsible governance and government structures, as well as other stakeholders e.g. land users, owners, enterprises as well as citizens. The topic has transnational dimension.

SR-3: Sustainability of water resources and of quality of water management services

In relation to the sustainability of water resources and of quality of water management services in agricultural, forest and urban landscape the topic of assessment of global and regional factors influencing of development of water balance is from the point of view of NKSs crucial:

Natural capital

- Assessment of global (incl. climatic) and regional factors influencing the development of water balance in the territory and predicting of environmental and economic effects due the proposed/implemented measures.

Why and for whom is this relevant topic? What aspects are parts of the issue?

Absence of proper approaches could bring higher price for water for citizens, industry, negatively influence water based biotopes and eco-system services. The addresses regarding the research outputs are responsible subjects for water management/supply and land users.

SR-4: Approaches, methods and instruments of the lowering and elimination of natural hazards and risks (floods, forest calamites, forest fires, geodynamic hazards and erosion)

The growing exposure to external shocks increases important of innovative approaches methods and instruments of assessment and proper reflection of hazards and risks in decision making and implementation of the development interventions.

Land management

- Risk assessment on drought and foods as the effects of climate change and anthropic changes in the landscape.
- Development of the mitigation measures to lower abiotic and biotic damages on forest.
- Integration of interrelations between land-soil-water and sediments in the frame of integrated management.

Net impacts

- Risk assessment on land use/soil use in relation the quality of water.

Why and for whom is this relevant topic? What aspects are parts of the issue?

This topic, although locally based has transnational dimension. The subjects addressed are all levels of responsible governance and government structures, as well as other stakeholders e.g. land users, owners, enterprises as well as citizens. The topic has transnational dimension. The absence of proper responds on natural risks and hazards would have trans generation effects. Responsible are state government in the collaboration with self-government, professional and research institutions but the users of the land and natural resources as well.

SR-5: Risk assessment in regard to land use effects on the quality of natural resources

Reflecting the dynamics of changes in the land use, lack of coordination among requests from different human activities, conflicts in the land use itself and with protection and sustainable use of natural resources following topic are of special importance:

Land management

- Research on changes in the landscape, spatial optimalisation of the land use.
- Ecologic optimal functional landscape organization.
- Development of the model of integrated landscape management based on system approach to the landscape as an integration of natural resources in respective space.

Net impacts

- Strategic assessment of the quality and efficient use of landscape, environmental loads, potentials, and limits – development of assessment methods, incl. risks and degradation processes assessment.

Why and for whom is this relevant topic? What aspects are parts of the issue?

This topic, although locally based has transnational dimension. The subjects addressed are all levels of responsible governance and government structures, as well as other stakeholders e.g. land users, owners, enterprises as well as citizens. The topic has transnational dimension. The absence of proper responds on natural risks and hazards would have trans generation effects. Responsible are state government in the collaboration with self-government, professional and research institutions but the users of the land and natural resources as well.

SR-6: Mapping and assessment of natural capital, mapping, assessment and revitalization of degraded landscape ecosystems and the landscape ability to provide ecosystem services

In relation to the efficient use of landscape the research on mapping and assessment methods of natural capital and on revitalization approaches of the degraded ecosystems are of special importance. This includes:

Natural capital

- Mapping and assessment of landscape and biotopes` fragmentation with special focus on urban landscape and biodiversity in urban landscape and methods of its protection and revitalization.

Land management

- Approaches, methods and instruments for efficient implementation of the ecosystem services concept into the practice of landscape integrative management incl. spatial planning with the stress on their benefits (as economic category as well).

Net impacts

- Approaches, methods and instruments for revitalisation of degraded landscape ecosystems incl. brownfields.
- Approaches, methods and instruments of multifunctional assessment and use of ecosystem services incl. the monitoring and assessment of threats between particular ecosystem services (e.g. production versus protection).

Why and for whom is this relevant topic? What aspects are parts of the issue?

This is relevant topic for all levels as it is important to have an overview about the natural capital, spatial distribution of the landscape ability to provide ecosystem services. This is important for planning and management, implementation of green economy, revitalization measures in the responsibility of the local, regional, national governance and government bodies and EU structures, professional organizations and institutions.

SR-7: Lowering of negative effects of urbanization, urban sprawl regulation, consequent monitoring of industrial production effects.

Important challenge for research represent urbanisation, urban sprawl as well as negative effects of intensive industrial production. In this context the NKSs under lined following research fields:

Natural capital

- Approaches, methods and instruments for identification of complex caring capacity of urban landscape and for monitoring and provision of the data on environmental quality incl. the risks accessible for all stakeholders in real time.

Land management

- Approaches, methods and instruments for green infrastructure revitalisation, development and maintenance.
- Approaches, methods and instruments for lowering and prevention of the negative impacts on human health.

Net impacts

- Approaches, methods and instruments of assessment of urban sprawl and its limitation and mitigation of negative effects.

Why and for whom is this relevant topic? What aspects are parts of the issue?

This is relevant topic for all levels as it is important to have an overview about the natural capital, spatial distribution of the landscape ability to provide ecosystem services. This is important for planning and management, implementation of green economy, revitalisation measures in the responsibility of the local, regional, national governance and government bodies and EU structures, professional organisations and institutions.

SR-8: Modeling of the global megatrends effects

In the context of global economic, social and environmental interlinks, global competition, global effects like biodiversity degradation, not efficient use of natural resources, climate changes special attention should be payed to the 11 megatrends listed by EEA in 5 clusters decision making for long-term perspective in European environment. Special focus should be oriented to the following questions and topics:

Land management

- How to lover growing pressure on ecosystems, degrading biodiversity, destruction of natural ecosystems?
- How predict and lower the effects of global urbanization on landscape, its structure, character, visual parameters with the goal to protect the value of cultural landscape?

Net impacts

- Development of new identification methods for environmental loads, for the assessment of synergies (sediments-water-soil-air) and transport of chemicals between respective mediums.
- What are the effects and development trajectories of different consumption models in regard to their environmental foot prints?
- Integrated modelling of global climate change effects.
- Integrated research on the effects of the transformation from industrial to post-industrial knowledge based society and economy on land, soil, water and landscape transformation/use and management.
- Integrated research on the effect of long-distance migration on land, soil, water and landscape demands and management.

Why and for whom is this relevant topic? What aspects are parts of the issue?

This is relevant topic for all levels as it is important to have an overview about megatrends effects to be expected, especially about the spatial distribution of the effects on ecosystems and their services. This is important for planning and management, implementation of green economy, revitalisation measures in the responsibility of the local, regional, national governance and government bodies and EU structures, professional organisations and institutions.

SR-9: Restoration of contaminated soils by heavy metals and organic pollutants as a consequence of anthropogenic activities

Using of agricultural soils and novel approaches of intensification of agriculture focusing on healthy food and higher demand for organic products is necessary to increase the quality of ecological soil functions.

Natural capital

- Assessment of opportunities for using of unutilised agricultural land.

Land management

- Setting of appropriate measurements for effective management of ecological farming.
- Approaches of renaturation for degraded soil systems (heavy metals, pesticides, salted soils etc.).
- Implementation of traditional techniques for viticulture management focusing on suburban zones.

Net impacts

- Identification and quantification of anthropogenic factors.

Why and for whom is this relevant topic? What aspects are parts of the issue?

Renaturation/remediation of degraded soil systems for farming will increase land use functions. These processes will be positive effect for the whole human society.

Implementation of traditional agricultural techniques (including viticulture management) will be positive for local and regional economics. The topic has transnational dimension. The absence of ecological agriculture should have significant trans generation effects. Responsible are state government in the collaboration with self-government, professional and research institutions but the users of the land and natural resources as well.

Relevant documents relating to the management of environment, water, soil, rural landscape…/

- Strategy for flooding protection and control to the year 2020 (2013).
- Adaptation Strategy of the Slovak Republic on Adverse Impacts of Climate Change (NAS) (2014).
- Slovak Operational Programme Quality of Environment (2014).
- Slovak Rural Development Programme (2014).
- Environmental Strategy Slovakia to the year 2030 (2015-2016) - Under preparation (the first draft is prepared for reviewing. Elaborated by the Ministry of Environment SR. The document will include a separate chapter on climate change and air protection).
- EU Framework Directive on Water.
- Landscape convention.
- Biodiversity convention.
- Directive 2007/60/EC on the assessment and management of flood risks.
- UN Framework Convention of Climate Change.
- Directive on Environmental Quality Standards.
- National Strategy of Sustainable Development.
- National sectoral strategies.
- Thematic strategy for soil protection.

Relevant documents relating to the science and research agenda

- Research and Innovation Strategy for Smart Specialization for Slovak Republic for period 2014-2020 / Stratégia výskumu a inovácií pre inteligentnú špecializáciu Slovenskej republiky: oblasť špecializácie pôdohospodárstvo a životné prostredie vrátane moderných chemických technológií šetrných k životnému prostrediu.
- Strategy of applied research in the agriculture/ Stratégia aplikovaného výskumu v pôdohospodárstve.
- Agricultural research in the Programme Horizon 2020 / Pôdohospodársky výskum v Programe Horizont 2020.
- Concept of advisor education for programming period 2014-2020 / Koncepcia vzdelávania poradcov na programovacie obdobie 2014-2020.
- European innovation partnership / Európske inovačné partnerstvo.
- Action plan for implementation of the Research and Innovation Strategy for Smart Specialisation for Slovak Republic for period 2014-2020 / Akčný plán implementácie Stratégie výskumu a inovácií pre inteligentnú špecializáciu SR na roky 2014 – 2016 marec 2015, Ministerstvo školstva, vedy, výskumu a športu SR a Ministerstvo hospodárstva SR (Action Plan for implementing research and innovation strategy for smart specialization SR for the years 2014 - 2016 in March 2015, the Ministry of Education, Science, Research and Sport SR and the Ministry of Economy SR).
- Up-date of the long-term strategy for state science and technology policy up to 2015 / Aktualizácia dlhodobého zámeru štátnej vednej a technickej politiky do roku 2015 (Stratégia Fénix) (Updating long-term state science and technology policy to the year 2015).
- Operational program reserch and innovations 2014-2020 / OPERAČNÝ PROGRAM VÝSKUM A INOVÁCIE 2014-2020, 2014, Ministerstvo školstva, vedy, výskumu a športu SR (OPERATIONAL PROGRAMME OF RESEARCH AND INNOVATION 2014-2020, 2014, Ministry of Education, Science, Research and Sports SR).
- Research and innovations strategy for smart specialisation of Slovak Republic - RIS3 / Poznatkami k prosperite - Stratégia výskumu a inovácií pre inteligentnú špecializáciu Slovenskej republiky (RIS3 SK). 13. november 2013 (Knowledge to prosperity - research and innovation strategy for smart specialization of the Slovak Republic).
- Zákon č. 172/2005 o organizácii štátnej podpory VaV a o doplnení zákona č. 575/200i Z. z. o organizácii činnosti vlády a organizácii ústrednej štátnej správy.
- Zákon č. 185/2009 Z. z. o stimuloch pre VaV a o doplnení zákona č. 595/2003 Z. z. o dani z príjmov v znení neskorších predpisov.

Other relevant documents

a) Information basis for integrated land management

- KEZIMK
- Integrated spatial information system - NIPI

b) Landscape-ecologic and spatial framework for integrated land management

- Land-use planning documents incl. landscape ecologic plans

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c) Sectoral documents

- Landscape and nature protection documents;
- Comasation documents;
- Forest management documents.
- Water management documents, planning documents for catchments areas;
- Flood protection documents;
- Others (e.g. protection and use of minerals, tourism...)

d) Documents and instruments of the environmental protection

- Integrated prevention and pollutions control (IPKZ)
- SEA/EIA documents

12.4 Experiences regarding connecting science to policy/practice

12.4.1 Use of knowledge

The NKSs understand the knowledge as a product of higher form of learning. The majority of NKSs lined the knowledge to scientific activities. Summarising the answers form the respondents we can formulate following definitions:

- The knowledge is a form of output from scientific or research activities obtained by basic or applied research, which can enrich following research activities, can be used in the practice, and can contribute to the quality of life. Knowledge is developed based on previous knowledge and on learning via deduction or observing. Knowledge can be validated by following research. Acceptance of new knowledge is evidence based.
- Information oriented towards getting data to solve the problems.
- Findings obtained based on data collected by defined methodology and assessed based on clear criteria and methodologies.
- Scientific knowledge is answer to the question formulated by research based on societal demand or individual demand representing capital the value of which is given by the effects from its use.

The use of the scientific knowledge is different depending from the position of the stakeholders. Majority of NKSs use scientific knowledge for improvement of their work, for research, publishing of scientific papers, practical projects and problem solutions, for education. More than 80% of the NKSs use the knowledge as the basis for deriving new knowledge and professional work. App. 50% of NKSs uses the knowledge in the projects and NKSs from academic environment for educational purposes as well. The representatives from SMEs and NGOs use the knowledge as a basis for practical solutions in the field of environment, the representatives from governance structures predominantly for decision making. The cyclic character of knowledge has been underlined – the knowledge is used for deriving new knowledge.

Similarity to the knowledge as well the knowledge sources are different, mostly the project work was appointed as the source not only by academicians but NGO and SMEs as well. Important role in gaining the knowledge the “good practices” are playing. In the age of ICT important role play not only conferences and printing materials but the web pages, data-bases providing quick access to the sources. Up to 70% of the NKSs appointed own colleagues as the source of knowledge. Absolutely marginal is the role of media mostly oriented to commercial purposes and science is not the focus for them or marginal.

The NKSs use the newest knowledge very often up to average, some of them even every day. The main factor of their use is the awareness about their existence, accessibility and technical and personal capacities in respective institution/NGO/SME/enterprise. There were the availability and the accessibility of proper data-bases defined as important problems. Event the data-bases created with the support or fully financed from the public budget have not free access for researchers. The problem is routine in dealing with the data too. Lower accessibility of knowledge was indicated by the sectoral research institutions and SMEs. Involvement of researchers and scientists into the formulation of research and science

policies is very week. Although they use to be invited to be the members of the respective committees, their voice is taken into account only marginally. From the point of view of researchers and scientists the topic of land /soil, water and landscape is only marginally represented in science and research policies (e.g.RIS3) in Slovakia because of the dominance of technology-oriented topics. The opinion of the policies authors is in contradiction with this view expressed in the interviews as well during the workshops. The policies authors underlined the fact, that the policies mirror state of art of the knowledge in the World and in Slovakia and disponibility of intellectual capital in Slovakia for coming planning period.

12.4.2 Possibilities to set the agenda

- Scientists feel to have enough information to influence the right orientation of the research and science policies and are ready to offer them to the decision makers, but they feel lack of interests from their side. The scientists try to provide their knowledge for the practice, but the transfer process is not properly functioning (more than 50% of NKSs have very negative experience).
- Positive experience was identified in the case of environmental policy in 1990-2006 where the transfer from science toward the practice was rather successful (e.g. landscape planning in the building code, in the act of nature and landscape protection, territorial systems of ecologic stability as a part of land consolidation plans, methodologies for landscape planning documentations, new law on EIA/SEA and methodologies in this field, sustainable development strategies at national, regional and local levels, Strategy for biodiversity protection and its Action plan...). National strategy for sustainable development was fully in the hands of professionals, as well as the development of Regional and Local Agenda documents was broadly supported by the scientists in many cases in the position of activists. As the problem was appointed their implementation efficiency, many of measures based on newest knowledge has not been implemented in the practice. The same for Biodiversity Protection Strategy and its Action Plan.
- National strategies/agendas do not mirror specific needs of academic community in a proper way, in many cases their adoption is only formal with no practical effects, and the measures are moved from year to year, from document to document. Slovak Republic has got many of documents elaborated on high professional level, but their implementation is formal, the realisation of the included measures use to be moved from year to year, many of them ignored and stay only in the declarative position. Many of documents are elaborated only as they are required by international agreements. The policies are influenced by lobbing and interests of specific interest groups.

- Different opinion was represented by the representatives responsible for policies` development stressing that the broad professional discussion created the base for the formulation of the Concept for science and research policy for 2014 – 2020 with the perspective up to 2030. The Ministry for education, science and research and youth established workshops under participation of the representatives form universities, Slovak Academy of Science, industry, enterprises and associations. The outputs were analytical documents mapping the needs, possibilities and infrastructure in respective fields of science and research (the representatives of land use and management were not included) and proposal for priorities for the period 2014-2020 up to 2030 mirrored in the RIS3 KS. The most progressive way how to transfer the outputs form the R&D into the practice seems to be the grant scheme for enterprises with the stated support. Regarding the knowledge transfer towards practice was the new law on state grants for enterprises No. 185/2009 Z. z. About the stimulus for science and research mentioned. But this is only marginally relevant for land use and management.
- NKSs assessed the National RIS3 SK strategy as not complex document defining state science and research strategy. Such documents absent at the national as well as regional levels (e.g. program declaration of the government, state programs). The measures included are not sufficient to solve the problems. Research and science are in long term period underfinanced. 0, 5 % GDP is very low proportion (average in EU 27 is 1,82 % GDP) and the advised level by EC is 3 %. (See Annex III). The research institutions have to find own resources (can nut use own budget from state subventions) to co-finance EU projects although the outputs from the projects are not targeted to them but to the public sector. Private sector is not properly motivated to finance research and development, the basic research is marginalized even by the state supporting technology oriented research. The public sector at the lover than national level is absolutely passive in supporting the research although there are many specific needs at the local and regional level, they do not have adequate financial resources to finance research.
- The final phase of the research – model solutions, pre-production is under-financed

12.4.3 Science – policy – practice

Majority of the NKSs participating at the survey as well as on national workshops was involved in the formulation of scientific research, realisation of scientific research and synthesizing/wrapping-up of scientific knowledge. They perceived their participation as satisfactorial up to neutral, in one case as negative. Their participation contributed to the formulation of strategic documents, methodologies and their transfer into the new norms. New software for modelling of natural processes, the database of the natural environment parameters as the basis for management and decision making processes are the products as well.

The NKSs consider as necessary:

- to support the knowledge transfer into the practice,
- to respect the law,
- to formulate the goals for strategic research and consequently fill them up across election periods,
- to support SMSs,
- to support consortia of research institutions and subjects from the practice,
- to increase involvement of the representatives from outside of academic society on the science and research policy formulations,
- to strengthen integrative approach to environmental problems,
- to coordinate scientific potential and avoid duplicities,
- to be more consequent in the control of national and regional projects and their effects for the practice,
- to support consequently environmental education across different levels of educational system.

Indicators for the assessment of scientific and research performance are based on Main Science and Technology Indicators OECD. As crucial indicators for monitoring the efficiency of the research are appointed following indicators:

- Number of SCI publications.
- Number of SCI quotations.
- Number of patents.
- Inventions and utility models.
- Discoveries.
- Licences.

These indicators are not proper for the environmental research, they do not reflect specific needs of regional and local environmental research (e.g. transfer towards regional/local practice). They are mostly quantitative and not qualitative, not oriented towards effects and usability of the outputs.

As the indicators showing added value are mostly used following indicators:

- New partnership between academic and business sector.
- New research-educational working place.
- New enterprise under participating of researchers.
- New research and development projects based on outputs from the project.
- Derived projects for international competition.
- New research infrastructure.
- New incubators oriented towards certain economic sector.
- New science and technology park.
- New certified laboratory.
- Accreditation of new PhD study program.
- Education of new researchers, popularization of the research outputs and mobility.

Societal effect of the research on the protection of particular natural resources is low. There are available knowledge, methodologies, and models focused on efficient and sustainable use of nature, natural resources, land-use, modelling the natural risks and hazards, scenario building but their usability in the practice is low. The NKSs indicated only 30% rate of usability of the research outputs in the practice.

12.5 National and transnational funding schemes

12.5.1 Funding schemes and possibilities for research funding

There are different sources national and international used as the sources for financing the research in Slovakia. Most important financial resources are represented by:

- Resources from local and regional authorities.
- National resources KEGA, VEGA, APVV, sectoral ministries.
- European, H2020, Interreg, Norway fund, Swiss fund, Life, URBACT, V4 fund.
- International Future Earth, MAB UNESCO, IPBES.

As the international sources are very competitive and connected with huge administrative load of work, big pressure is at the national level of grant schemes, but the amount of finances in national schemes is very low and the grants do not allow serious research in (time and sources requiring projects) the field of living environment, especially in the VEGA scheme. **Successful realisations of the EU projects hamper administrative barriers, bureaucratic procurement processes not fitting to the scientific services or infrastructure procurement, not proper models of financing (based on hours spent and not on effects), need of co-financing e.g. in INTERREG projects as well as late reimbursement of the expenditures, discrimination of some research units in the calls (structural funds) e.g. not eligibility for researchers from Bratislava although they have the same precondition, if not worser, than others in SK. Due the international lobismus underdeveloped from Slovak representatives in Brussels Slovak researchers do not have the same access to the H2020 and other European schemes.**

Added value and synergies among different sources can be improved by the measures listed by the NKSs as follows:

- to invest more public resources in strategic research,
- to finance basic research form the state budget across the sectoral division of research unites,
- to co-finance applied research via sectoral ministries and their institutions,
- to increase the proportion of private resources via proper supportive measures,
- to eliminate not correct lobbing from European as well as national level,
- to guarantee fear professional assessment of the projects, to eliminate complicated administration,
- to define proper assessment criteria for the project outputs, to focus on outputs and not on formal aspects like number of hours spent etc.,
- to eliminate un-equal payment for equal performance at the European level,
- to coordinate thematic research, to avoid duplicity, to support collaboration and coordination,
- to support transfer from the research to the practice in the not business oriented fields.

12.5.2 Gaps in financial resources for research

NKSs reflected the situation with following advices:

- to improve research coordination especially inter-sectoral coordination,
- priority on the research with clear linked to the identified or expected problems in society,
- to prioritise research focused on environmental effects,
- to avoid financing of the research by the firms, individuals, NGO without proper own human capital, laboratories and technologies,
- to stop negative development in financing the research,
- to improve awareness about the role of science and research in society,
- to support integrative instead of particular research (60% of NKSs identified problem that even integrative projects proposals end with sectoral research projects in reality),
- to create proper legal/institutional framework for integrative financing of the research,(to create agency for integrated research support),
- to create proper fair environment for European competition based on equal payment for equal performance.

12.6 Other remarks made by interviewees and national workshops

The existence of the R&D fields not properly covered by existing mechanism of financing has been broadly discussed during the workshops showing different opinions of participants as well as official documents on science and research development. The position of the authors of respective policies speaks about adequate sources for all relevant societal topics. In opposite, the researchers, users and NGOs representatives insists, that the interdisciplinary research in the field of living/natural environment is not sufficiently covered. The progress in this field has been achieved mostly from the point of view of particular problems and fields. Their integration is the challenge for next period.

The reviews as well as the analyses of official strategic documents show, that there is no any national priority directly dealing with the land use. The closest is the priority Agriculture and living environment, but this is a part of technology oriented set of topics with the stress on progressive technologies in agriculture and food production and production of healthy food. For researchers in the field of land use there is the only possibility to apply for the grands from international programmes (e.g. H2020, EEA, …) supporting interdisciplinary topics related to integrated land management or climate change adaptation.

In the Action Plan for implementing research and innovation strategy for smart specialization SR for the years2014 – 2016, approved in March 2015 (the Ministry of Education, Science, Research and Sport SR and the Ministry of Economy SR) the goal to interlink research and innovation with immediate problems of societal practice is mentioned.

As, by the national priorities, not sufficiently covered very important topics are especially appointed integrate landscape management, integrated catchment area management, ecologic bearing capacity, eco-system services and first of all their economic expression. The level of the implementation of integrative approach is different across Europe; in Slovakia the field of regulations and institutional arrangements is covered. Under the pressure there are some attempts to lover the standards. The sectoral approach is still dominant, and this problem is difficult to solve as this is linked to strong economic interests. In the same time, the necessity to finance research on specific national topics is discussed several years, the regional reflection of global topics incl.

The same problem is in the research. This is on one hand because of much more easy understanding of analytical and integrative aspects, on the other hand because of much more easy possibility to present and to assess the outputs / e.g. access to respective more scientific field than interdisciplinary oriented scientific journals. This leads to low ability to subordinate particular analytical research to integrative overlapping scheme.

“Societal” demands accept integrative approach only in the conceptual level. In real use of landscape are sectoral, group of individual interest dominant. The research has not to follow this approach, not to build on it**. In this context, the financing musses not follow these schemes**. In the policies as well institutional arrangements in the field of research and executive land management the integrative approaches have to be implemented (there are preconditions in the SR, only the realisation is not adequate). This should be mirrored in the financing schemes as well, including interdisciplinary and transdisciplinary research.

This is opinion shared by the majority of 60% of respondents and workshops participants **underlining that even supported integrative projects earlier or later end in the sectoral approaches**. As examples can be listed the Integrative regional operational programs prepared on integrative principles, but ending with the support of particular sectoral projects as sewage systems building, regeneration of yards in the neighbourhoods, elements of green infrastructure etc. Both groups of NKSs – users and policy makers share opinion, that the Slovak Republic finances a lot of programs without priorities and with not proper financial amounts. Very week is support of environmental projects by private sector. Not satisfying is the situation of the involvement into the FP and HORIZON2020.

This is partially due the handicaps of Slovak teams (language, administration, capacities to prepare the applications), but the main reason is strong lobbing, preferences on "big players", presence of the representatives of them among evaluators and in Brussels of more or less the same organisations. The main administrative load is on the shoulders of academicians – scientists and researchers teams, starting with the monitoring of information, via administration of the project proposals up to administration of the projects themselves. In many environmentally oriented projects are not represented the partners from all affected countries, which is the precondition for successful efficient solutions as the problems do not know administrative territorial borders (e.g. Danube Strategy). Insufficient is complemental research at the regional and local level which needs support from the state level.

Summarising it is necessary to underline long term problem in Slovakia – very low proportion of the GDP flowing to the R&D in the comparison with the EU, Eurozone (see the table below)

GEO/ROK	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EÚ(28)	1,76	1,76	1,78	1,78	1,85	1,94	1,93	1,97	2,01	2,02
Eurozóna (18)	1,79	1,78	1,81	1,81	1,9	1,99	2	2,04	2,09	2,12
SR	0,5	0,49	0,48	0,45	0,46	0,47	0,62	0,67	0,81	0,83

Source: Eurostat

The participation of private sector on financial support for R&D is very low, current legal environment as well as mechanism are not enough motivating for them. Only seldom the private sector feel the need to establish permanent flow of information form the R&D institutions to them. The proportion of the private sector on financing the R&D in the SR in comparison with EU and Eurozone shows following table:

GEO/ROK	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EÚ(28)	1,12	1,11	1,13	1,13	1,17	1,2	1,19	1,24	1,27	1,29
Eurozóna (18)	1,13	1,12	1,14	1,15	1,2	1,23	1,24	1,29	1,34	1,35
SR	0,25	0,25	0,21	0,18	0,2	0,2	0,26	0,25	0,34	0,38

Source: Eurostat

Positive aspects of the development so far can be from the perspective of NKSs defined as follows:

- Definition of the needs of interdisciplinary approach in the field of protection and use of natural resources.
- Implementation of available knowledge into the legal framework and partially in planning and programming practice, harmonisation of the law with the EU.
- Elaboration of several strategic documents under the participation of professionals, researchers and scientists.
- Availability of the knowledge for the policy makers and broad public.
- Support of larger environmentally oriented projects.
- Involvement of broader spectrum of stakeholders into the research projects (limited).
- Development of planning documents for catchment areas and for flood prevention reflecting recent knowledge.

Negative aspects of the development so far can be from the perspective of NKSs defined as follows:

- Sustaining formal approaches to the problems of sustainable development, much more declarative than practical strategic documents and their implementation.
- Low level of coordination among subjects responsible for implementation of policies and strategies starting with EU ending with local level, incl. research activities, data collections, sectoral policies and their effects.
- Gap between available knowledge and real life due the lack of capacities, finances, awareness on the side of the subjects responsible for implementation of the policies across different levels of government and governance.
- Not sufficient activation of different disciplines into the integrated research, dominance of natural sciences, lack of complex approaches including social, economy and technology sciences, lack of methodologic, terminological and instrumental coordination.
- Lack of financial resources for integrative research and lack of institutional support for such research on land-soil-water-landscape issues.
- Insufficient awareness about need of new knowledge, need of integrative research on land-soil-water-landscape issues, marginalisation of environmental research against technology research.

To face the above mentioned problems and to use efficiently potentials the NKSs see the necessity:

- to improve the financing incl. activation of private resources, to provide stabile environment for systematic research,
- to solve the problem of co-financing by research institutions of the research in which the public sector is the target sector for the outputs,
- to improve preconditions for involvement of Slovak scientists in international research,
- to establish fair and equal payments for equal performance in EU funded projects,
- to support interdisciplinary and complexity of related disciplines in respective research projects,
- to improve communication among subjects in the research arena and decision makers in the field of R&D,
- to apply new criteria for the assessment of the research projects with the focus on research outputs quality and not on formal administration of the projects like spent time reporting,
- to support investments into the knowledge implementation in the private as well as in the public sector,
- to improve accessibility of the data,
- to support local and regional research,
- to develop state programmes for research support in national specific fields.

It is necessary to avoid:

- Preference the sectoral approaches to the research on land-soil-water-landscape topics.
- To accept formal assessment instead of assessment of the quality and quantity of outputs.
- To prefer specific research topics instead of cross-oriented topics with high relevance for practice.
- Contradicting interests in research.
- Subjective assessment of the projects and negative lobbing influence.

12.7 Annexes

Annex Ia: NKS interviews in Slovakia (Ruzomberok, Bratislava, Zvolen)

Date of interview	Organisation	Interview	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
17-08-15	Catholic Univ. Ruzomberok	Maria Kozova			1		1						1			1
27-09 - 15	Ministry of education, science...	Peter Plavcan	1			1							1	1	1	1
17-08-15	Catholic Univ. Ruzomberok	Jaroslav Demko			1		1						1		1	1
11-09-15	Slovak Land Office in Liptovsky Mikulas	Metod Simun		1						1			1			1
11-09-15	District Office in Liptovsky Mikulas	Katarina Uhriková		1		1							1			1
14-09-15	Research Institute for Soil Science and Conservation in Bratislave	Jaroslava Sobocka			1		1						1			1
18-09-15	Distric Office in Ružomberok	Milan Filo		1		1							1		1	1
01-10-15	MONDI, SCP, Ruzomberok	Milada Macholova		1					1				1			1
02-10-15	City Office in Ruzomberok	Michal Slastan		1		1										1

08-10-15	Water Research Institute in Bratislava	Radoslav Bujnovsky			1		1								1	1
13-10-15	Catholic University in Ruzomberok	Eduard Bublinec			1		1						1			1
29-10-15	Slovak Environmental Agency in Zilina	Slamkova Marta			1		1						1		1	1
03-11-15	Water Company in Ruzomberok	Jan Bednarik		1				1							1	
03-11-15	Urban Forest in Ruzomberok	Milan Slavka		1				1					1			1
09-11-15	Regional Public Health Office in Banska Bystrica	Daniela Borosova		1		1									1	1
15-11-15	Laboratory monitoring of air quality, ENVItech Trencin	Marcel Ochodnicky		1	1			1								1
21-09-15	Biosfíra	František Petrovič	1		1					1			1			1
10-11-15	MŠ		1			1										
14-09-15	Esprit, s.r.o.	Dušan Kočický		1	1			1					1		1	1

17-09-15	Krajina 21	Tatiana Hrnčiarová			1					1			1			1
21-09-15	Európska Akadémia vied a umení	Štefan Luby			1		1						1			
17-09-15	Regioplán	Peter Mederly		1	1				1				1			1
15-09-15	Ústav krajinnej ekológie SAV	Dagmar Štefunková			1	1	1									1
30-09-15	SPU Nitra	Ján Supuka			1		1						1			1
20-09-15	SPU Nitra	Ľuboš Jurík			1		1						1		1	
21-09-15	UKF Nitra	Juraj Hreško			1		1						1	1	1	1
27-09-15	MAB UNESCO	Július Oszlányi	1	1	1	1				1						1
31-08-15		Zuzana Gúziová		1	1					1						1
08-10-15	VÚVH	Radoslav Bujnovský			1		1						1		1	
02-10-15	GÚ SAV	Milan Lehotský			1	1	1							1	1	1
09-09-15	STU Zvolen	László Miklós			1		1						1		1	1
25-09-15	Magistrát Bratislava		1	1		1										1
03-11-15	PriF UK	Vladimír Kováč	1		1		1								1	
04-11-15	GI PriF UK	Michal Kováč	1		1		1							1		
03-11-15	PriF UK	Alexandra Šimonovičová			1		1						1	1		
05-11-15	PriF UK	Zlatica Ženišová			1		1							1	1	
06-11-15	PriF UK	David Krčmář			1		1							1	1	
11-9-15	Cetip	Veronika Gežík			1		1						1			1

18-9-15	ŠOP SR	Saxa Andrej, Černecký Ján			1	1		1					1		1	1
18-9-15	ŠOP SR	Kadlečík Ján			1	1		1					1		1	1
10-9-15	SAŽP	Pastorek Peter	1		1	1							1	1	1	1
17-09-15	Štátne lesy	Mika Ľuboslav		1					1							1
16-9-15	ÚEL SAV	Ľubica Ditmarová			1		1						1		1	1
21-9-15	SEVS	Jozef Minďáš			1		1									1
16-9-15	Univerzita Zvolen	Rastislav Šulek			1		1						1		1	1
04-9-15	MŽP	Rastislav Rybanič	1		1	1							1	1	1	1
7-10-15	SvF STU	Viliam Macura			1		1								1	
7-10-15	EURAS	Lubomir Jamecny		1	1			1								1

Annex Ib: NKS questionnaire template

Slovak version of the questionnaire

INtegrated Spatial PlannIng, Land Use and Soil Management Research AcTION (INSPIRATION)

Výskumné opatrenia pre integrované priestorové plánovanie, využívanie zeme a manažment pôdy

Dobrý deň,

oslovili sme Vás v rámci projektu INSPIRATION financovaného Európskou Komisiou, ktorý je zameraný na formuláciu strategického plánu výskumu a vylepšenie systému financovania v oblastiach výskumu využitia pôdy, vody, manažmentu územia, ochrany prírody a krajiny. V rámci projektu bude oslovených 20 respondentov za každú krajinu EÚ (územní plánovači, odborníci na pôdu, vodu, lesy, manažéri, politici, členovia záujmových organizácií). Tento rozhovor je dôležitý pre získanie poznatkov o aktuálnom stave vývoja výskumu v našej krajine ako vstupný materiál do EU výskumného programu. Vďaka rozhovoru máte aj vy možnosť ovplyvniť ďalšie smerovanie strategického plánu výskumu a systému jeho financovania. Výsledky rozhovorov budú prediskutovane na workshopoch, ktoré sa na SR budú konať v mestách Bratislava, Zvolen a Ružomberok v priebehu októbra (Bratislava: 09. 10. 2015, Ružomberok: 12. 10. 2015 a Zvolen 16. 10. 2015) a budú využité pre správu Európskej komisie ako podklad pre tvorbu strategického plánu výskumu v problematike efektívneho a udržateľného využitia pôdy a územia.

Prikladáme otázky pre rozhovor:

A. Informácie z rozhovoru

Krajina: SLOVENSKO

Meno INSPIRATION výskumníka:

Dátum rozhovoru: .....

B. Predstavenie projektu a jeho cieľov (pozrite si predchádzajúce dve úvodné strany)

C. Základné informácie o respondentovi:

1. Meno respondenta (NKS – National Key Stakeholders, Národné kľúčové zainteresované organizácie/záujmové skupiny) s ktorým sa realizoval rozhovor:

2. Inštitúcia:

3. Postavenie v inštitúcii:

4. Inštitúcia v ktorej pracujete (viac možných odpovedí) je :

- Národný - regionálny - lokálny orgán
- Univerzita / výskumný ústav
- Malý alebo stredne veľký podnik (MSP, t.j. < 500 zamestnancov) / konzultant
- Obchod a priemysel
- Mimovládna organizácia
- Zástupca reťazca / vedúci
- Iné, špecifikujte:…

5. Oblasti špecializácie vo vzťahu k problematike efektívneho a udržateľného využitia pôdy / územia (viac možných odpovedí)

- Pôda
- Voda
- Sedimenty
- Urbanizmus/priestorové plánovanie
- Krajinný dizajn (tvorba krajiny)
- Pôdohospodárstvo
- Iné, špecifikujte

6. Financuje vaša organizácia externý výskum v problematike efektívneho a udržateľného využitia pôdy / územia (realizovaný mimo vlastnej inštitúcie)?

- Áno. Prosíme spresniť:
- Nie

D. SRA – Strategický plán výskumu

7.A Aké spoločenské výzvy považujete za dôležité vo vzťahu k problematike efektívneho a udržateľného využitia pôdy / územia?

- Prispieť k potravinovej bezpečnosti a bezpečnosti potravín;
- Zaistiť bezpečné dodávky pitnej vody;
- Zabezpečiť dodávku a distribúciu energie;
- Znížiť spotrebu primárnych surovín a zdrojov, Zabezpečenie efektívneho využívania prírodných zdrojov.
- Participovať na zmierňovaní klimatických zmien a sociálne prispôsobenie;
- Prispievať k zdravému životnému prostrediu;
- Zabezpečiť bezpečnú infraštruktúru

7.B Pokiaľ je možné, aké ďalšie, iné alebo alternatívne výzvy v problematike efektívneho a udržateľného využitia pôdy/územia považujete za dôležité?

8. Na základe vlastných skúseností aké **konkrétne témy** (potreby skúmať) by mali byť zahrnuté do strategického plánu výskumu v problematike efektívneho a udržateľného využitia pôdy/územia?

Prosíme pre každú Vami uvedenú tému skúste povedať:

8.A. - Kto bude ovplyvnený?

- Kto je zodpovedný?
- Je táto téma témou Vašej organizácie/oddelenia?
- Je to len národná téma, alebo zdieľaná s ďalšími krajinami?
- Kde sme teraz a kde chceme byť o X rokov (výhľadovo/cieľovo) pri riešení tejto témy? *(či vidí nejakú zmenu, podnikli sa kroky na zlepšenie?)*
- Ako môžu byť novo získané poznatky efektívne využívané?

8 B. Prosíme pre každú Vami uvedenú tému skúste definovať jej prioritu (Akú prioritu v rámci strategickej agendy výskumu by ste jej pridelili):

1. Vysoká priorita
2. Čiastočná priorita
3. Neutrálna priorita
4. Nízka priorita
5. Žiadna priorita

- Ak sa s touto problematikou nič neurobí, aké budú podľa Vás následky do budúcna?

8.C Prosíme skúste definovať, kto chce/ resp. kto by mal financovať výskumu v nasledujúcich oblastiach?

- hodnotenie pôdneho fondu
- potenciálna produktivita územia a pôdy
- dopyt po pôdnych/krajinných zdrojoch, import a export
- konkurencia vo využívaní územia (konflikty využívania krajiny)
- koncepty pre identifikáciu a kvantifikáciu relevantných dopadov
- výskum nástrojov na zabránenie / minimalizovanie dopadov (spätná väzba na rozhodovací proces)
- možnosti inovatívnych technológií pri využívaní územia
- zdrojovo-orientované systémy hospodárenia s pôdou
- regenerácia pôdy
- sanácia pôdy a spodnej vody

9. V súvislosti s témami, ktoré ste uviedli ako dôležité z Vášho pohľadu ako témy pre výskum problematiky efektívneho a udržateľného využitia pôdy/územia v predošlej otázke (8A) prosíme uveďte:

9.A. Aké sú dôležité / relevantné dokumenty, výskumné programy a agendy podporujúce tieto témy v súčasnosti?

9.B. V súvislosti s týmito agendami a programami: Aké sú časové možnosti ovplyvniť ich agendy (je možné ich ešte ovplyvniť, je možné ich ovplyvniť v ich behu? Periodicky?)

9.C Poskytujete krátkodobé granty vo vzťahu k problematike efektívneho a udržateľného využitia pôdy / územia. Ak áno, aké?

9.D Využili ste vy/vaša inštitúcia tieto krátkodobé granty vo vzťahu k problematike efektívneho a udržateľného využitia pôdy / územia? Ak áno, aké?

E. Veda-politika-vzájomné vzťahy (SPI)

10. Ako by ste definovali “vedecké poznatky”?

11. Na čo používate vedecké poznatky vo svojej práci?

12. Aké zdroje (vedeckých) poznatkov využívate vo svojej práci?

- vedecké články
- konzultanti
- správy
- kolegovia
- skúsenosti / príklady v mojej vlastnej krajine
- skúsenosti / príklady v zahraničí
- denná tlač (noviny)
- televízia
- konferencie, účasť na výskumných projektoch
- dáta (databázy)
- webové stránky, ako napr.:
- iné, uveďte:

13. Do akej miery využívate najnovšie/nové vedecké poznatky pri svojej práci?

14. Do akej miery ste schopný ovplyvniť (a ako) smerovanie (nastavenie) vedeckých výskumných politík/agend vo vašej krajine?

15. Do akej miery vaše národné politiky/agendy odzrkadľujú vaše špecifické potreby a priority?

16. Do akej miery boli využité najnovšie vedecké poznatky pri formulovaní existujúcich politík vo vašej krajine?

(ak ste v pozícii zodpovedných za tvorbu politík - keď plánujete politiky, do akej miery Vás ovplyvňuje výskum/výsledky výskumu? Využívate/ aplikujete do tvorby nových politík výsledky najnovšieho výskumu s cieľom vylepšiť existujúce politiky?)

Nasledujúca otázka 17 je iba pre respondentov, ktorí sú k mimo akademického sektora (priemysel, riadenie...)

17. Boli ste už niekedy zapojený do: *(odpovedáte za inštitúciu, možnosť výberu viacerých odpovedí)*

a. formulácie otázok vedeckému výskumu?

b. robiť vedecký výskum (teda do spoluvytvárania poznatkov)?

c. syntetizovanie/integrácia vedeckých poznatkov, napr. preniesť vedu do tvorby politiky, alebo zlepšiť ekonomiku?

Ak áno prosíme posúďte

- Ako úspešné /uspokojujúce to bolo, stupnica od 1-5?

1. Veľmi úspešný/uspokojujúci
2. Úspešné/uspokojujúce
3. Neutrálny
4. Neúspešný/neuspokojivý
5. Veľmi neúspešný/neuspokojivý

- Čo sa podarilo?
- Čo by sa dalo zlepšiť?
- Čoho sa vyvarovať ?
- Ďalšie poznámky?

Nasledujúca otázka 18 je pre respondentov, ktorí majú prehľad o tejto téme (týka sa napr. tých, ktorí financujú výskum)

18. Aký spoločenský dopad má vedecký výskum v oblasti efektívneho a udržateľného využitia pôdy / územia na Slovensku *(do akej miery sú výsledky výskumu aplikované do praxe, politík,...?)*

Prosíme skúste tento dopad aj zhodnotiť

- Ako úspešné/uspokojivé je to na stupnici 1-5?

1. Veľmi úspešný/uspokojujúci
2. Úspešné/uspokojujúce
3. Neutrálny
4. Neúspešný/neuspokojivý
5. Veľmi neúspešný/neuspokojivý

- Aké indikátory sú používané pre hodnotenie spoločenského dopadu? (počet článkov s impact factorom, množstvo podaných a schválených projektov,...)

- Čo vidíte pozitívne v SR v rámci tejto problematiky?
- Čo by sa dalo zlepšiť?
- Čoho sa vyvarovať ?
- Ďalšie poznámky?

19. Ktoré národné dokumenty zamerané na interface/prepojenie medzi politikou

(myslí sa politika v oblastiach praktického života ako napr. politika životného prostredia, politika bytová a pod.) a vedou poznáte alebo môžete ich odporučiť? (RIS) – Regionálna inovačná stratégia, resp. (RVIS) Regionálny výskumná a inovačná stratégia alebo podobné dokumenty, ktoré sa vypracovali pre celé Slovensko.

F. Financovanie

20. Aké skúsenosti a očakávania zo systému financovania (verejné/súkromné) máte vo svojej oblasti, ktoré môžu byť užitočné pre budúci výskum využívania územia/manažmentu územia a súvisiacich vplyvov na systém pôda/sedimenty/voda:

- Vnútroštátne / regionálne?
- Národné?
- Európske [napr. H2020, Interreg, multi-laterálne ako sú iniciatívy spoločného plánovania]
- Medzinárodné? [Belmont Forum, nadácie a pod.]

21. Ako zvýšiť pridanú hodnotu rôznych finančných zdrojov (t.j. dosiahnuť multiplikáciu) pre výskum, ktorý prispieva k potrebám EÚ a národným potrebám *(najmä pre požiadavky výskumu a Inovácií pre krajinu a SSW systém: pôda – sedimenty – voda?)*

22. Existujú oblasti výskumu a inovácií (R&I) pri ktorých ste si vedomí že nie sú (v súčasnosti) zastrešené súčasným mechanizmom financovania a ktoré potrebujú nový/iný spôsob financovania ako v súčasnosti majú?

23. *Integrované prístupy (nutné na riešenie konkrétnych spoločenských výziev spojených s užívaním a hospodárením s územím a súvisiacich vplyvov na systém pôda – sedimenty – voda) sú zvyčajne veľmi komplikovane financovateľné lebo reagujú na rôzne spoločenské výzvy – potreby, ktoré sú sledované rôznymi zodpovednými subjektmi.*

Máte návrhy na vylepšenie integrovaného systému financovania, do ktorého je zapojených viacero oblastí/sektorov a je ťažké rozhodnúť o alokovaní finančných zdrojov jednotlivými subjektmi samostatne? (Akým spôsobom by systém alokovania finančných zdrojov mohol byť transparentnejším, jednoduchším?

24. Na základe predchádzajúcich skúseností z praxe a podľa vášho názoru: ako najlepšie nastaviť/upraviť možnosti systému financovania strategického výskumu tak, aby boli naplnené spoločenské požiadavky a vedomosti získané realizáciou strategickej agendy výskumu v oblasti efektívneho a udržateľného využívania územia/pôdy boli naozaj využívané?

- Ako by ste hodnotili doterajšie využitie poznatkov z výskumu v tejto oblasti na stupnici 1-5?

1. Veľmi úspešný/uspokojujúci
2. Úspešné/uspokojujúce
3. Neutrálny
4. Neúspešný/neuspokojivý
5. Veľmi neúspešný/neuspokojivý

- Čo sa podarilo/čo vidíte ako pozitívne?

- Čo by sa dalo zlepšiť?

- Čoho sa vyvarovať / nerobiť?

- Ďalšie poznámky?

G. Vaše ďalšie doplnenia (poznámky, námety, príklady)

H. Ukončenie rozhovoru

Ďakujeme, že ste sa zúčastnili tohto rozhovoru. Želáte si byť ďalej informovaný o ďalších výsledkoch projektu INSPIRATION?

1. Chceli by ste navrhnúť ešte niekoho pre takýto rozhovor?
2. Navrhovali by ste ešte nejakú inú otázku/tému, ktorá by mala byť zaradená do informácie pre Európsku komisiu?
3. Akú informáciu ako spätnú väzbu si želáte:
    - Oficiálnu adresovanú inštitúcii
    - Neformálnu, napr. na Váš email
    - Neželáte si spätnú väzbu
    - Celú správu
    - Sumár zo správy
    - Národnú správu
    - Sumár z rozhovorov

Pokiaľ si želáte, aby Vám boli zasielané informácie o priebehu projektu INSPIRATION, vyplývajú z toho pre Vašu inštitúciu výhody ako vytvorenie nových kontaktov, prehľad o aktuálnej situácii výskumu a systéme financovania nielen v SR ale aj v ostatných krajinách EÚ a aká bude ďalšia Agenda strategického výskumu.

Výsledky rozhovoru budú zverejnené za inštitúciu, nie za osobu (pokiaľ si neželáte inak).

Veľmi pekne Vám ďakujeme za Váš čas, ktorý ste venovali vyplneniu vybraných otázok dotazníka.

Za riešiteľský kolektív, ...

Podrobné informácie o projekte INSPIRATION získate na stránkach:

http://www.inspiration-h2020.eu

http://www.spectra-perseus.org/index.php/Projects/INSPIRATION-H2020

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

See Chapter1, Annex II

Annex Id: R&I funding options collated for Slovakia

R&I funding options collated for country: Slovakia

	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
Regional				
1	Fund for rural development	Private/public subjects, members of consortium	expertise for self-governance subjects and NGO in the region Banska Bystrica (and other regions), only transfer of know-how. Miestny rozvoj je vedený komunitou (CLLD), resp. metódou LEADER.	http://rozvojvidieka.webnode.sk/o-nas/, http://nsrv.sk/index.php
2	Small environmental funds established by large companies e.g. Orange, Slovnaft, banks, non-profit funds e.g. EkoPolis Foundation and other (in limited scope also municipalities and regional self-government	Private parties and non-profit sector	small environmentally and community oriented mainly implementation oriented projects and transfer of know how	https://www.nadaciaorange.sk/sk/granty-komunitny-rozvoj-teraz-realizujeme-sanca-pre-vas-region-2015 , http://www.ekopolis.sk/tlacove-spravy-1/nadacia-ekopolis-a-slovnaft-vyhlasuju-6-rocnik-grantoveho-programu-zelene-oazy.html,

National				
3	KEGA / Cultural and Educational Grant Agency	State via Ministry of Education, Science, Research and Sport of the SR	small applied research linked to the education only	https://www.minedu.sk/kulturna-a-edukacna-grantova-agentura-msvvas-sr-kega/
4	Environmental Fund	State via Ministry of Environment	very limited scope on chosen environmentally oriented activities directly for chosen institutions or in competition	www.envirofond.sk
5	VEGA /(Scientific Grant Agency	State via Ministry of Education, Science, Research and Sport of the SR and Slovak Academy of Science	small research grants for universities and Slovak Academy of Science	https://www.minedu.sk/vedecka-grantova-agentura-msvvas-sr-a-sav-vega/
6	APVV / Slovak Research and Development Agency	State via Ministry of Education, Science, Research and Sport of the SR	research and development promotion in all research fields, including international research cooperation.	www.apvv.sk, http://www.apvv.sk/grantove-schemy/multilateralne-vyzvy

European/International				
7	Horizon 2020 (and before EU Framework Programmes).	EU and private investments	EU Research and Innovation programme (2014 to 2020). Open for consortia, with different parties on different topics (e.g. societal challenges)	https://ec.europa.eu/programmes/horizon2020/
8	JPI - Joint Programming Initiatives	Member States commit to Joint Programming Initiatives (JPIs)	open for consortia of the contributing member states	http://ec.europa.eu/research/era/joint-programming_en.html
9	Interreg	Financed by the European Regional Development Fund	helps regions of Europe share knowledge and transfer experience to improve regional policy	http://www.interreg4c.eu/
10	ERANET - European Research Area Network	instrument under Horizon 2020	instrument to support public-public partnerships in their preparation, establishment of networking structures, design, implementation and coordination of joint activities as well as topping up of single joint calls and of actions of a transnational nature	http://ec.europa.eu/research/era/era-net-in-horizon-2020_en.html
11	LIFE +	instrument under Horizon 2021	EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU	http://ec.europa.eu/environment/life/

12	European structural funds	EU	Structural Funds play a substantial role to help all regions build research and innovation capacities corresponding to their situation and priorities: Operational Programme Quality of the Environment, Research and Innovation, Education...	http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=structural_funds
13	COST - European Cooperation in Science and Technology	EU	European framework supporting trans-national cooperation among researchers, engineers and scholars across Europe.	http://www.cost.eu/
14	Norway Fund / EEA - Iceland, Liechtenstein, Norway Fund	Norway Grants / EEA Grants - Bilateral Fund at National Level aimed at the implementation of activities for strengthening of the bilateral relations between the Slovak Republic and the Donor States (Norway, Liechtenstein and	Increasing competitiveness of green enterprises and green job creation. The Programme also focuses on adaptation to climate change issues, the protection of water retention capacity of soil, forest and meadows; restoring forest ecosystems, increased soil erosion protection and revitalising waterways; improving the definition of flood plains and areas at disk during flooding; and informing	http://eeagrants.org/Where-we-work/Slovakia

		Iceland).	the public about flood prevention measures and preparedness.	
15	Future Earth	the International Council for Science (ICSU), the International Social Science Council (ISSC), the Belmont Forum of funding agencies, the Sustainable Development Solutions Network (SDSN), STS forum, the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), the United Nations University (UNU), and the World Meteorological Organization.	international research platform providing the knowledge and support to accelerate our transformations to a sustainable world	http://www.futureearth.org/who-we-are

16	'Intergovernmental Platform on Biodiversity and Ecosystem Services' (IPBES)	United Nations	mechanism recognized by both the scientific and policy communities to synthesize, review, assess and critically evaluate relevant information and knowledge generated worldwide by governments, academia, scientific organizations, non-governmental organizations and indigenous communities.	http://www.ipbes.net/index.php/about-ipbes
17	Man and the Biosphere Programme (MAB)	UNESCO	develops the basis within the natural and social sciences for the rational and sustainable use and conservation of the resources of the biosphere and for the improvement of the overall relationship between people and their environment. It predicts the consequences of today's actions on tomorrow's world and thereby increases people's ability to efficiently manage natural resources for the well-being of both human populations and the environment.	http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/about-mab/

18	Swiss/Slovak Cooperation Programme	Swiss and Slovak governments	grant scheme to support projects of Slovak social and environmental NGOs through so called Small projects and The Block Grant for Partnership Support is aimed at supporting partnership projects of Slovak and Swiss institutions through so called Joint projects.	http://www.ekopolis.sk/en/programs/grant-programs/swiss-slovak-cooperation-program.html
19	Revolving funds	Different funds. Examples: some European structural funds, e.g. JESSICA (Joint European Support for Sustainable Investment in City Areas)	Improving flood resilience and raising public awareness of flood prevention, Strengthening cross-border cooperation with Ukraine	http://ec.europa.eu/regional_policy/index.cfm/en/funding/special-support-instruments/jessica/
20	"International Co-operation in Education and Research - Central, Eastern and South Eastern European Region Programme	German government via Federal Ministry of Education and Research (BMBF)	selected projects following defined priorities incl. environmental topics	Environment and Sustainability (http://www.bmbf.de/en/502.php) - Framework Programme Research for Sustainability "FoNa" (http://www.bmbf.de/en/2559.php) - The Earth System (http://www.bmbf.de/en/917.php) , Life Sciences (http://www.bmbf.de/en/1237.php) - Health Research (http://www.bmbf.de/en/gesundheitsforschung.php

				) , Economic sciences for sustainability (http://www.bmbf.de/en/4815.php)
21	European subsidies	EU	e.g. for agricultural sector, European rural development programs	not for research, only in some cases implementation
22	Visegrad Fund	Visegrad countries	short and long term grands supporting collaboration among Visegrad countries in the culture, research and other activities. The purpose of the fund is also to facilitate and promote the development of closer cooperation among citizens and institutions in the region as well as between the V4 region and other countries, especially in the Western Balkan and Eastern Partnership regions.	www.visegradfund.org
23	European Union Strategy for the Danube Region	The area covered by the EU Strategy for the Danube Region stretches from the Black Forest (Germany) to the Black Sea (Romania-Ukraine-Moldova)	Financed through European Structural and Investment funds (ESIF)	http://www.danube-region.eu/

International				
1	none mentioned			

* Include full name and (if available) acronym of the R&I funding option

** Include name of the R&I funder/funding institute or authority

*** Detail which type of programme, projects, partners or infrastructures they are funding

**** Include weblink and/or other reference for more information on this R&I funding option

Annex II: Documents used for the SK desk study

1. Akčný plán implementácie Stratégie výskumu a inovácií pre inteligentnú špecializáciu SR na roky 2014 – 2016 marec 2015, Ministerstvo školstva, vedy, výskumu a športu SR a Ministerstvo hospodárstva SR *(Action Plan for implementing research and innovation strategy for smart specialization SR for the years 2014 - 2016 in March 2015, the Ministry of Education, Science, Research and Sport SR and the Ministry of Economy SR)*
2. Aktualizácia dlhodobého zámeru štátnej vednej a technickej politiky do roku 2015 (Stratégia Fénix) *(Updating long-term state science and technology policy to the year 2015)*
3. OPERAČNÝ PROGRAM VÝSKUM A INOVÁCIE 2014-2020, 2014, Ministerstvo školstva, vedy, výskumu a športu SR *(OPERATIONAL PROGRAMME OF RESEARCH AND INNOVATION 2014-2020, 2014, Ministry of Education, Science, Research and Sports SR)*
4. Otvorene o problémoch výskumu na Slovensku, rozhovor s prorektorom UK pre vedeckovýskumnú činnosť a doktorandské štúdium prof. RNDr. Petrom Moczom, DrSc. Publikovaný v časopise Naša Univerzita, Univerzita Komenského v Bratislave, október 2015 *(Openly about the problems of research in Slovakia, interview with Pro-Rector for scientific research and doctoral studies prof. Mgr. Peter Moczo, PhD. Published in the journal Our University, Comenius University in Bratislava, October 2015)*
5. Poznatkami k prosperite - Stratégia výskumu a inovácií pre inteligentnú špecializáciu Slovenskej republiky (RIS3 SK). 13. november 2013 *(Knowledge to prosperity - research and innovation strategy for smart specialization of the Slovak Republic)*
6. Regionálna výskumná a inovačná stratégia Žilinského kraja 2014+ Akčný plán, 31. 5. 2015, VTP Žilina *(Regional Research and Innovation Strategy 2014+ Žilina region, Action Plan)*
7. Regionálna výskumná a inovačná stratégia Žilinského kraja 2014+, február 2015, VTP Žilina *(Regional Research and Innovation Strategy 2014+ Žilina region)*
8. Správa o stave výskumu a vývoja za rok 2014, Ministerstvo školstva, vedy, výskumu a športu SR, Bratislava, september 2015. *(Report on the state of research and development for the year 2014, Ministry of Education, Science, Research and Sport SR, Bratislava, September 2015)*
9. Zákon č. 194/2014, ktorým sa mení a dopĺňa zákon č. 172/2005 Z. z. o organizácii štátnej podpory výskumu a vývoja a o doplnení zákona č. 575/2001 Z. z. o organizácii činnosti vlády a organizácii ústrednej štátnej správy v znení neskorších predpisov *(Act no. 194/2014 amending and supplementing Law no. 172/2005 Coll. on organization of state support for research and development and amendment of Act no. 575/2001 Coll. the organization of government activities and the organization of central state administration as amended)*

10. Zákon č. 23/2015, ktorým sa mení a dopĺňa zákon č. 185/2009 Z. z. o stimuloch pre výskum a vývoj a o doplnení zákona č. 595/2003 Z. z. o dani z príjmov v znení neskorších predpisov *(Act no. 23/2015 amending and supplementing Law no. 185/2009 Coll. Incentives for research and development and amendment of Act no. 595/2003 Coll. on income tax, as amended)*
11. Audit výdavkov rozpočtu verejnej správy na výskum a inovácie v rámci Slovenskej republiky, MINISTERSTVO FINANCIÍ SR Číslo: 07/02/2015 Materiál na rokovanie Rady vlády SR na podporu exportu a investícií, Bratislava 17. júna 2015
12. Najvyšší kontrolný úrad Slovenskej republiky 3 Súhrnná správa o výsledku kontroly financovania vedecko-výskumnej činnosti zo zahraničných zdrojov na vybraných vysokých školách a univerzitách, Bratislava, október 201
13. https://www.vedatechnika.sk/SK/Financovanie/Stranky/StatneZdroje.aspx

Annex III:

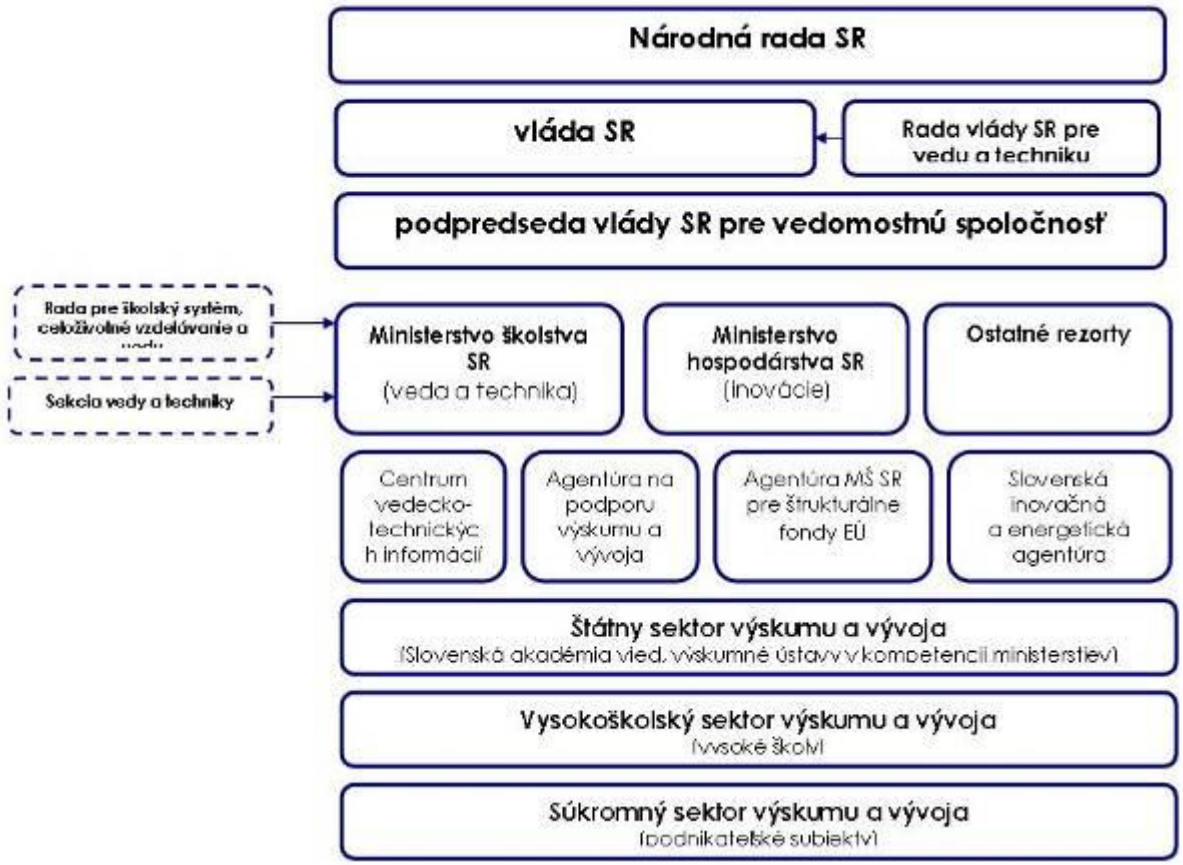
Critical comment to the state science and research policy management

- The governmental board for science, technology and innovation should be the stabile professional advisory coordination board of the government for science, technology and innovations incl. the innovations in the field of forestry, wood production, biotechnologies, food industry, building materials, and innovations in the health care and agriculture,
- but it is a board directly created from the government members incl. the prime minister, and ministers. The only representative of the science is the president of the Slovak Academy of Sciences.

Kritický komentár k riadeniu štátnej vedecko-technickej politiky

- Rada vlády SR pre vedu, techniku a inovácie (ďalej len „rada“) by mala byť podľa štatútu stálym odborným, poradným, iniciatívnym a koordinačným orgánom vlády pre oblasť vedy a techniky a oblasť inovácií vrátane inovácií v oblasti produkcie a spracovania dreva, lesníctva, biotechnológií, potravinárstva, stavebných výrobkov a inovácií v zdravotníctve a pôdohospodárstve.

Riadenie štátnej vedecko-technickej a inovačnej politiky – *schéma*



- Ide však o orgán priamo prepojený a riadený vládou a rezortmi (t. j. vláda radí sama sebe), keďže orgánmi rady sú predseda rady a predsedníctvo rady. Predsedom rady je predseda vlády Slovenskej republiky. Predsedníctvo rady tvoria predseda rady a podpredsedovia rady. Podpredsedami rady sú minister školstva, vedy, výskumu a športu Slovenskej republiky, minister hospodárstva Slovenskej republiky, podpredseda vlády a minister financií Slovenskej republiky; z vedeckých ustanovizní je v predsedníctve iba predseda Slovenskej akadémie vied.

Source:
https://www.vedatechnika.sk/SK/VedaATechnikaVSR/Stranky/Riadenie%C5%A1t%C3%A1tnejatechnickejpolitiky.aspx (overené 4. 11. 2015)

Kritický komentár k Správe o stave výskumu a vývoja za rok 2014 (1)

Vice-rector of the Commenius University the largest and oldest university in Slovakia provided broader comment (in addition to the review) to the Report on the state of art of the research and development in the SR in the year 2014. The main comments and critical points are included in the national report. Here the quotations from his statement.

Prorektor UK pre vedeckovýskumnú činnosť a doktorandské štúdium prof. RNDr. Petrom Moczom, DrSc. Sa na základe otázok MŠVVŠ SR v rámci dotazníka k vyjadril veľmi otvorene a kriticky K Správe o stave výskumu a vývoja za rok 2014. Z jeho názorov vyberáme tie podstatné, ktoré sa priamo dotýkajú projektu INSPIRATION, najmä otázky financovania vedy a výskumu a spolupráce vedeckých inštitúcií s podnikateľskou sférou a praxou:

Absencia dôležitých nástrojov a podfinancovanie vedy a výskumu

- Na konci roka 2013 schválila vláda Stratégiu výskumu a inovácií pre inteligentnú špecializáciu Slovenskej republiky (ďalej „RIS3 SK“). RIS3 SK nie je komplexným dokumentom charakteru formulovania vednej politiky štátu. Takýto dokument Slovensku zreteľne chýba. Absencia je dôsledkom aj rastúcej falošnej ilúzie vo vzťahu k slobodnému základnému výskumu a výskumu vyžiadanému praxou. Opatrenia v dokumente nie sú dostačujúce pre rozvoj vedy a techniky.
- V politike výskumu a vývoja na Slovensku absentujú viaceré dôležité nástroje. Chýba vedná politika štátu už na úrovni dokumentu a adekvátna realizácia správne formulovaného programového vyhlásenia vlády.
- Neskutočné podfinancovanie Agentúry na podporu výskumu a vývoja (APVV) spôsobuje, že APVV prestáva byť nástrojom podpory vedy a výskumu. Chýba rozumná väzba medzi kvalitou a financovaním univerzít a vysokých škôl. Chýba systémové opatrenie pre post-doktorandov. Celková podpora nie je dostatočná. Poskytovaná podpora nie je rozumne štruktúrovaná a hierarchizovaná.
- Výskum na Slovensku je dlhodobo významne podfinancovaný – približne 0,5 % HDP je absolútne málo a aj relatívne málo vzhľadom k výdavkom v ostatných krajinách (priemer v 27 krajinách EÚ je 1,82 % HDP) a vzhľadom k 3 % doporučeným EÚ.

- Výsledky, dôsledky a aplikácie slobodného základného výskumu a bádania priniesli viac technického a spoločenského pokroku a finančného zisku ako výskum na základe priamej objednávky z priemyslu a poľnohospodárstva. Rastie rozpor medzi mierou podielu výsledkov základného výskumu na každodennom živote jednotlivcov i celej spoločnosti na jednej strane a mierou toho, ako si verejnosť, podnikatelia a politici tento podiel uvedomujú.
- Chýba dostatočné stabilné (predvídateľné) inštitucionálne financovanie. Chýba dostatočné stabilné grantové financovanie (prostriedky na prístroje, softvér, služby, mzdy pre doktorandov a post-doktorandov). Zbytočne budú vybudované nové infraštruktúry a vedecké parky zo štrukturálnych fondov, ak nebudú dostatočné grantové prostriedky na výskum v týchto zariadeniach a ak v nich nebudú pracovať špičkoví vedci napríklad preto, lebo odídu do zahraničia.
- Na financovaní výskumu sa nedostatočne podieľa súkromný sektor. Súkromný sektor sa primárne zaujíma o krátkodobé finančné aspekty viac ako o perspektívnu a zmysluplnú spoluprácu.
- Výrazným a bolestivým problémom je verejné obstarávanie. Reálne znamená zvýšenie nákladov o 20 %, v prípade štrukturálnych projektov až o 50 – 100 %. Verejné obstarávanie je v súčasnej podobe kontraproduktívne aj z pohľadu časovej a administratívnej náročnosti.

Návrhy ako zlepšiť spoluprácu vysokých škôl a verejných organizácií výskumu a vývoja s podnikateľskou sférou

- Treba začať formulovaním vednej politiky za účasti najlepších vedcov reprezentujúcich základný a aplikovaný výskum rešpektujúci slobodu bádania, výskum zameraný na priemysel, výskum zameraný na spoločenské výzvy, výskum zameraný na bezpečnosť a ochranu štátu, národne a regionálne orientovaný výskum.
- Podnikateľská sféra by sa mala orientovať nielen krátkodobo – finančne ale skutočne aj v prospech spoločnosti a dlhodobej perspektívy Slovenska. Na to je potrebné, aby úlohe, významu a nutnosti všetkých druhov výskumov porozumela.

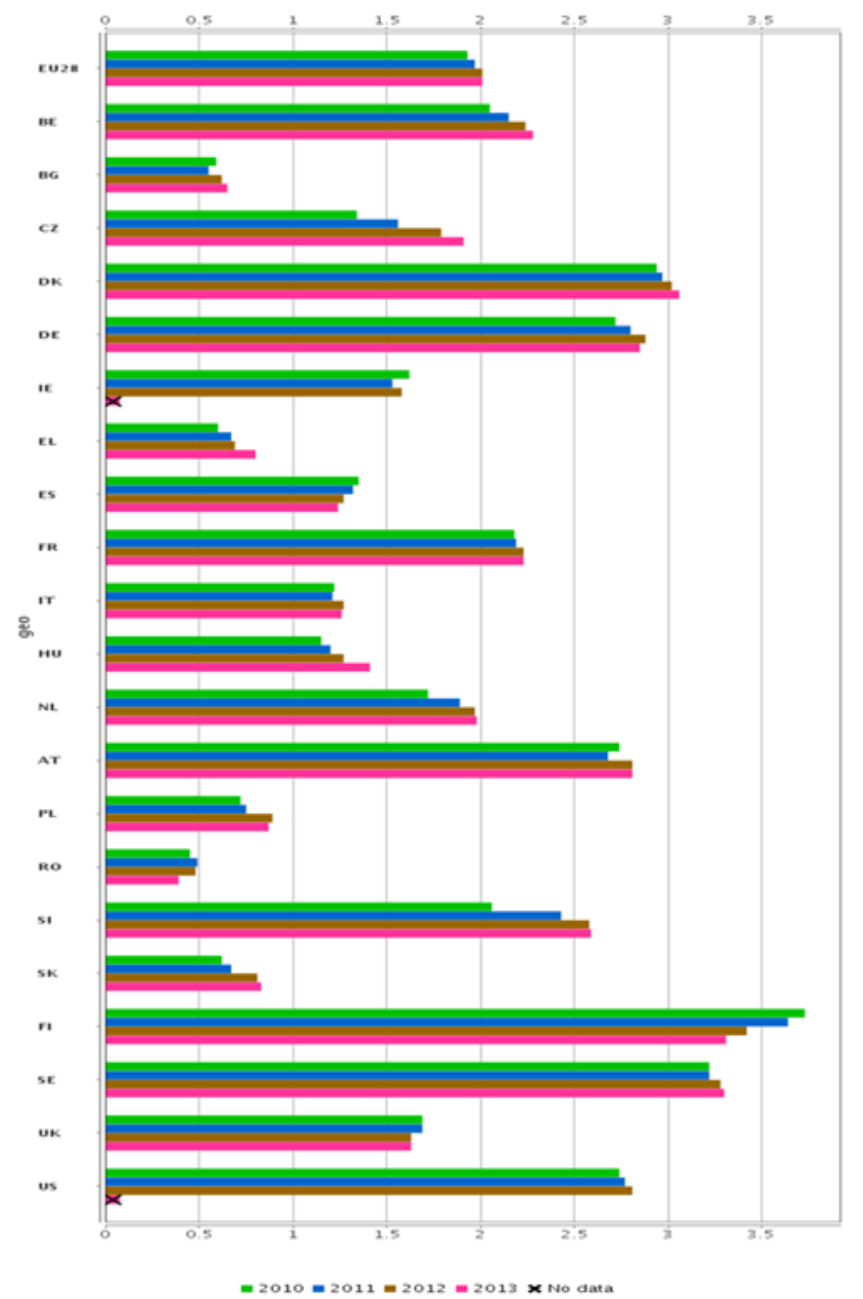
Source: Otvorene o problémoch výskumu na Slovensku, rozhovor s prorektorom UK pre vedeckovýskumnú činnosť a doktorandské štúdium prof. RNDr. Petrom Moczom, DrSc. Publikovaný v časopise Naša Univerzita, Univerzita Komenského v Bratislave, október 2015 *(Openly about the problems of research in Slovakia, interview with Pro-Rector for scientific research and doctoral studies prof. Mgr. Peter Moczo, PhD. Published in the journal Our University, Comenius University in Bratislava, October 2015)*

Comparation with the EU member states

Porovnanie so zahraničím

Expenditures for research and development 2010-2013 in % from the GDP

Výdavky na výskum a vývoj, 2010–13 (% HDP). Source/ Zdroj: EUROSTAT.



Source: Správa o stave výskumu a vývoja za rok 2014, Ministerstvo školstva, vedy, výskumu a športu SR, Bratislava, september 2015. (Report on the state of research and development for the year 2014, Ministry of Education, Science, Research and Sport SR, Bratislava, September 2015)

Critical comment to the state of art of human resources in the research and development, unbalanced financing of basic and applied research and lacking behind interrelations between science and practice

Kritický komentár k stavu ľudských zdrojov vo výskume a vývoji, financovaniu vedy a výskumu, nevyváženosti financovania základného a aplikovaného výskumu a zaostávaniu prepojenia vedy s praxou

Based on the data from the Up-date of the long term strategy of state science and technology policy (Stratégia Fénix – source: *OECD, Science, Technology and Innovation Scoreboard, 2009*) Slovakia is the country with largest decrease of the number of researchers in private sector between1997 and 2007, average 7,5 % yearly. Only in 3 countries was decline and average growth in OECD countries was 3,5 %. Slovakia is one of 5 countries with total decline of the number of employees – 0.5 % yearly. Here some examples of the comparation of the Slovakia and other OECD countries.

Podľa údajov uvedených v Aktualizácii dlhodobého zámeru štátnej vednej a technickej politiky do roku 2015 (Stratégia Fénix – zdroj: OECD, Science, Technology and Innovation Scoreboard, 2009) Slovensko je krajina s najväčším poklesom počtu výskumníkov v súkromnom sektore za roky 1997– 2007, priemerne 7,5 % medziročne. Iba v troch krajinách tento počet klesal, priemerný medziročný rast v krajinách OECD je cca 3,5%. Navyše sme jedna z piatich krajín, kde za roky 1998 – 2008 poklesol podiel všetkých ľudí zamestnaných vo VaV – ročne priemerne o 0,5%. Počet samotných vedcov síce rástol, ale iba tempom 2% za rok, čo je 7. najnižšia hodnota spomedzi krajín OECD. Vybrali sme niekoľko konkrétnych príkladov zaostávania Slovenska v porovnaní s krajinami OECD.

1.1 Dostupnosť vedcov a technikov

12.06 Availability of scientists and engineers: To what extent are scientists and engineers available in your country? [1 = not at all; 7 = widely available]

krajina	skóre	zmena[2]
Fínsko	6,0	0,1
Japonsko	5,8	-0,1
Švédsko	5,8	0,2
USA	5,7	0,2
Francúzsko	5,3	-0,3
Švajčiarsko	5,3	0,1
Belgicko	5,2	0,1
Dánsko	5,1	-0,2
Írsko	5,1	-0,2
Nórsko	5,1	-0,1
Grécko	5,0	-0,2
Holandsko	5,0	0,1
Nemecko	4,8	-0,1
Veľká Británia	4,8	0,0
Rakúsko	4,7	-0,3
Portugalsko	4,6	0,1
Česká republika	4,4	-1,0
Maďarsko	4,4	-0,1
Litva	4,4	0,2
Španielsko	4,4	-0,2
Taliansko	4,3	-0,2
Rumunsko	4,3	0,0
Estónsko	4,2	0,1
Poľsko	4,2	0,1
Bulharsko	4,0	0,3
Slovenská republika	**4,0**	**-0,9**
Slovinsko	4,0	0,1
Luxembursko	3,9	0,0

1.1: Zdroj: WEF, The Global Competitiveness Report, 2010 – prieskum názorov manažérov na škále 1 (najhoršie) – 7 (najlepšie)

[2] Celková zmena počas rokov 2008 – 2010.

1.2 Dostupnosť kvalifikovaných technikov

4.2.15 Qualified engineers: "Qualified engineers are available in your labor market"

krajina	skóre	zmena[1]
Fínsko	8,46	0,12
Dánsko	7,94	0,22
Francúzsko	7,87	-0,03
USA	7,78	0,03
Švédsko	7,76	0,21
Rakúsko	7,65	0,00
Írsko	7,56	0,07
Nórsko	7,48	0,07
Grécko	7,41	0,01
Japonsko	7,39	0,04
Litva	7,35	0,52
Španielsko	7,24	0,04
Švajčiarsko	7,16	0,02
Holandsko	7,14	0,12
Portugalsko	6,98	0,09
Taliansko	6,88	0,02
Veľká Británia	6,78	0,07
Nemecko	6,62	0,00
Poľsko	6,55	-0,01
Česká republika	6,55	0,03
Luxembursko	6,51	0,08
Belgicko	6,44	0,00
Slovenská republika	**6,16**	**-0,29**
Maďarsko	6,16	-0,24
Bulharsko	5,66	-0,07
Slovinsko	5,57	0,06
Estónsko	5,16	0,07
Rumunsko	5,12	-0,32

1.2: Zdroj: IMD, World Competitiveness Yearbook, 2010 – prieskum názorov manažérov na škále 0 (najhoršie) – 10 (najlepšie)

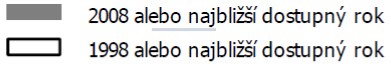
[1] Priemerná medziročná zmena počas rokov 2000 – 2010 alebo počas sledovaného obdobia u krajín s dostupnými údajmi za toto obdobie, v prípade Slovenska môže byť počítaná aj za kratšie obdobia.

3. Financovanie výskumu a vývoja

3.1 Celkové výdavky na VaV ako % z HDP

GERD as percentage of GDP, by country
1998 and 2008, or nearest available years

krajina	1998	2008
Izrael	3,1	4,9
Švédsko	3,5	3,8
Fínsko	2,9	3,7
Japonsko	3,0	3,4
Južná Kórea	2,2	3,4
Švajčiarsko	2,7	3,0
USA	2,6	2,8
Dánsko	2,0	2,7
Rakúsko	1,8	2,7
Singapur	1,8	2,7
Island	2,0	2,7
Nemecko	2,3	2,6
priemer OECD	2,1	2,3
Francúzsko	2,1	2,0
Austrália	1,4	2,0
Belgicko	1,9	1,9
Kanada	1,8	1,8
EU-27	1,7	1,8
Veľká Británia	1,8	1,8
Holandsko	1,9	1,8
Slovinsko	1,3	1,7
Luxembursko		1,6
Nórsko	1,6	1,6
Čína	0,7	1,5
Portugalsko	0,7	1,5
Česká republika	1,1	1,5
Írsko	1,2	1,4
Španielsko	0,9	1,4
Nový Zéland	1,1	1,2
Taliansko	1,0	1,2
Rusko	1,0	1,0
Maďarsko	0,7	1,0
Juhoafrická republika	0,6	0,9
Turecko	0,4	0,7
Poľsko	0,7	0,6
Rumunsko	0,5	0,6
Grécko	0,5	0,6
Argentína	0,4	0,5
Slovenská republika	**0,8**	**0,5**
Mexiko	0,3	0,4



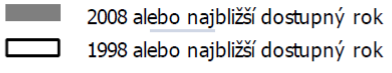
3.1: Zdroj: OECD, Science, Technology and Innovation Outlook, 2010, Figure 1.2., strana 25

[5] *Priemerná medziročná zmena výdavkov v percentuálnych bodoch za roky 1998 – 2008 alebo za najbližšie dostupné obdobie.*

3.2 Výdavky súkromného sektora na VaV ako % z HDP

BERD intensity, by country
1998 and 2008, or nearest available years

krajina	1998	2008
Izrael	2,1	3,9
Švédsko	2,6	2,8
Fínsko	1,9	2,8
Japonsko	2,1	2,7
Južná Kórea	1,6	2,5
Švajčiarsko	1,9	2,2
USA	1,9	2,0
Singapur	1,1	1,9
Dánsko	1,3	1,9
Rakúsko	1,1	1,9
Nemecko	1,5	1,8
priemer OECD	1,5	1,6
Island	0,7	1,4
Belgicko	1,3	1,3
Luxembursko		1,3
Francúzsko	1,3	1,3
Austrália	0,7	1,2
EU-27	1,0	1,1
Čína	0,3	1,1
Veľká Británia	1,2	1,1
Slovinsko	0,7	1,1
Kanada	1,1	1,0
Írsko	0,9	0,9
Česká republika	0,7	0,9
Holandsko	1,0	0,9
Nórsko	0,9	0,9
Portugalsko	0,1	0,8
Španielsko	0,5	0,7
Rusko	0,7	0,7
Taliansko	0,5	0,6
Juhoafrická republika	0,3	0,5
Maďarsko	0,3	0,5
Nový Zéland	0,3	0,5
Turecko	0,1	0,3
Slovenská republika	**0,5**	**0,2**
Poľsko	0,3	0,2
Mexiko	0,1	0,2
Rumunsko	0,4	0,2
Grécko	0,1	0,2
Argentína	0,1	0,2



3.2: Zdroj: OECD, Science, Technology and Innovation Outlook, 2010, Figure 1.4., strana 27

3.3 Porovnanie financovania základného a aplikovaného výskumu vo verejnom sektore ako podiel z HDP

Total R&D expenditure (GERD) by sectors of performance and type of R&D activity, Basic research / Applied research in Government + Higher education sector

krajina	basic[6]	applied[6]
Veľká Británia	23%	77%
Cyprus	27%	73%
Čína	27%	73%
Slovinsko	33%	67%
Portugalsko	43%	57%
Bulharsko	44%	56%
Island	44%	56%
Lotyšsko	45%	55%
Nórsko	45%	55%
Južná Kórea	46%	54%
Litva	50%	50%
Írsko	51%	49%
Rakúsko	52%	48%
Dánsko	54%	46%
Taliansko	54%	46%
Japonsko	55%	45%
Maďarsko	56%	44%
Chorvátsko	62%	38%
Estónsko	62%	38%
Rumunsko	64%	36%
Francúzsko	65%	35%
USA	68%	32%
Česká republika	71%	29%
Slovenská republika	**78%**	**22%**
Malta	92%	8%

3.3: Zdroj: European Commission,Eurostat, Science and technology database, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdact&lang=en

[6] *Priemerný podiel daného typu VaV vo verejnom sektore za roky 2003 – 2008 alebo za najbližšie dostupné obdobie*

5. Spolupráca vysokých škôl s praxou a transfer poznatkov

5.1 Spolupráca v oblasti VaV medzi univerzitami a súkromnou sférou

12.04 University-industry collaboration in R&D: To what extent do business and universities collaborate on research and development (R&D) in your country? [1 = do not collaborate at all; 7 = collaborate extensively]

krajina	skóre	zmena[2]
USA	5,8	0,0
Švajčiarsko	5,7	0,1
Fínsko	5,6	0,1
Veľká Británia	5,6	0,5
Švédsko	5,5	-0,1
Dánsko	5,3	0,0
Belgicko	5,2	0,0
Nemecko	5,2	-0,2
Holandsko	5,2	0,1
Luxembursko	5,1	1,2
Írsko	5,0	0,1
Rakúsko	4,9	-0,1
Japonsko	4,9	0,3
Nórsko	4,9	0,0
Česká republika	4,5	0,3
Portugalsko	4,5	0,9
Maďarsko	4,3	0,3
Estónsko	4,2	0,2
Litva	4,2	0,7
Slovinsko	4,2	0,3
Francúzsko	4,0	0,1
Španielsko	4,0	0,4
Poľsko	3,6	0,6
Taliansko	3,5	0,4
Slovenská republika	**3,3**	**-0,1**
Rumunsko	3,1	0,0
Bulharsko	3,0	0,1
Grécko	3,0	0,1

5.1: Zdroj: WEF, The Global Competitiveness Report, 2010 – prieskum názorov manažérov na škále 1 (najhoršie) – 7 (najlepšie)

[2] *Celková zmena počas rokov 2008 – 2010.*

5.2 Transfer poznatkov medzi podnikmi a univerzitami

4.3.22 Knowledge transfer: "Knowledge transfer is highly developed between companies and universities"

krajina	skóre	zmena[1]
Švajčiarsko	7,66	0,19
USA	7,60	0,11
Švédsko	6,93	0,13
Fínsko	6,83	-0,01
Rakúsko	6,78	0,20
Nemecko	6,65	0,13
Dánsko	6,63	0,18
Holandsko	6,57	0,06
Veľká Británia	6,39	0,20
Írsko	6,27	0,09
Belgicko	6,15	0,11
Japonsko	5,86	0,19
Nórsko	5,84	0,13
Luxembursko	5,28	0,11
Estónsko	4,96	0,14
Francúzsko	4,68	0,03
Česká republika	4,56	0,15
Litva	4,56	-0,03
Maďarsko	4,16	-0,06
Rumunsko	3,82	0,04
Portugalsko	3,80	0,08
Taliansko	3,79	0,09
Španielsko	3,76	0,05
Slovinsko	3,55	0,11
Poľsko	3,39	-0,08
Grécko	3,33	0,02
Slovenská republika	**2,70**	**-0,21**
Bulharsko	2,63	-0,27

5.2: Zdroj: IMD, World Competitiveness Yearbook, 2010 – prieskum názorov manažérov na škále 0 (najhoršie) – 10 (najlepšie)

[1] *Priemerná medziročná zmena počas rokov 2000 – 2010 alebo počas sledovaného obdobia u krajín s dostupnými údajmi za toto obdobie, v prípade Slovenska môže byť počítaná aj za kratšie obdobia.*

Source: Aktualizácia dlhodobého zámeru štátnej vednej a technickej politiky do roku 2015 (Stratégia Fénix) (Updating long-term state science and technology policy to the year 2015)

13. Slovenia

Report by Boštjan Cotič, Barbara Mušič, Ina Šuklje Erjavec, Matej Nikšič

13.1 Executive summary

13.1.1 English version

The report integrates detailed findings of the national workshop that was held in Ljubljana 10th December 2015 and 18 interviews with stakeholders, identified as the "National Key Stakeholders", NKS ranging from scientific researchers, research funders to current or potential users. They helped to identify and prioritize important societal challenges and research issues for Slovenia and also provided comments on funding, science-policy interface and issues related to research implementation.

The INSPIRATION project scope was recognized as important and relevant by majority of participants. The majority of the NKS consider all the societal challenges suggested from the European Commission equally important as well as too wide to really choose among them. Many of the interviewees also exposed, that healthy living environment is a cover topic and not in the same level with other challenges and therefor regarded it as the most important. When asked to point out three of the challenges, most of them decided for climate change mitigation and healthy living environment, but at the same time also proposed at least one missing societal challenge. It is also possible to ascertain that topics defined by stakeholders as more relevant or missing are most often linked to their mission and work.

The Slovenian Research Agency (Javna agencija za raziskovalno dejavnost Republike Slovenije – ARRS) has not defined any priority societal challenges to be addressed in the national research agenda. They fund topics that come entirely from the research institutions themselves (bottom-up approach).

Based on the interviews and the discussion held at Ljubljana conference it is clear that the participants were focused on very concrete research questions which arise from their professional activities. The proposed research issues can be sorted into four groups: 1 themes related to planning and management of land use, particularly in relation to bottom-up processes and regulation of planning, spatial coordination of policies and comprehensiveness of planning and development approaches that connect all relevant views and sectors; 2 themes related to climate change problems and their influence on the situation in Slovenia, with special emphasis on floods safety, drinking water supplay and dangerousness of land erosion; 3 third bigger group of questions is linked to the provision of safe (self)supplay of food which represents one of the key questions that currently engages Slovenian professional as well as political sphere and is currently at the stage of decision making on integral agriculture, eco-production and promotion of local products. The transfer from theory into practice is thus missing; 4 themes related to the efficiency of administrative procedures.

Definition of scientific knowledge, use of scientific knowledge and the usefulness in their work differs by the field of interviewee's daily work. Those who are involved in the scientific work, use scientific results more and value the available results, while interviewees that work in practice estimate that scientific results are not directly applicable to their needs, difficult to

understand and that there is a need for some kind of “translation” to become useful in the implementation level in real life.

Most of the answers indicated that is it very difficult to influence the setting of the scientific research policies/agendas in Slovenia. Good example of a policy that effectively used scientific research to prepare a policy (listed by several interviewees) are Development strategy of Slovenia and Spatial development strategy of Slovenia.

Answers from the non-science sector indicated, that generally they are not involved in the formulation of the scientific research questions, some of them are involved in the scientific research (directly or indirectly), but they mostly indicated that they are synthesizing /wrapping-up of scientific knowledge in order to fit their working processes. Most answers indicated that in Slovenia there is no document that would prescribe the process from Science to policy or vice versa transfer. However, Strategy for Smart specialization of Slovenia was pointed out as an example of such a document.

The main national funder of basic and applicative scientific research recognised by respondents is ARRS. They have different funding schemes, which can be used for research of INSPIRATION topics. Three most important are basic, applicative and bilateral research programmes. The funding mechanism of the Slovenian Research Agency is not based on the strategic research agenda, but they distribute funds according to the expressed research interest via public tenders. ARRS also directly finances different research groups within institutions and universities in accordance with their research programmes. Researchers that fulfil strict entrance criteria based on previous research work and publicity can win funding. Others, including final users, don’t have much influence on the research topics. That narrows the scope of funded research topics.

Also some ministries co-finance specific topics in collaboration with the Slovenian Research Agency in the form of Targeted research projects.

On the subnational level there is no systematic funding. The only funders that occasionally finance INSPIRATION related topics are bigger municipalities, but also in this case it is usually connected with their specific problems and not planned in advance.

The second most important source of funding for companies and organisations from Slovenia are different EU funded programmes, e.g. Horizon 2020, 7FP, Interreg programmes, ESPON, etc. For some scientific stakeholders these are even the most important sources of funding.

To increase the added value of financial sources, most of the respondents indicated the need for less administration and to speed-up the reimbursement process. The results of many EU and national projects should be better disseminated and used in practice on both national and local levels even after the end of the projects. Project results should be “translated” into user friendly language and form (simplification for general public).

To achieve integrated approaches and to best set up and govern funding options, different sectors should better co-operate and co-ordinate research needs. This is especially important for interdisciplinary research needs, since no sector by its own really detects cross-sectoral topics and is therefore not willing to finance. Several contributors see Spatial planning as a tool for effective interdisciplinary approach and space as a framework for cross-sectoral co-operation.

13.1.2 Slovene version

Poročilo združuje podrobne ugotovitve z nacionalne delavnice, ki je 10. decembra 2015 potekala v Ljubljani, in 18 intervjujev z deležniki, ki so bili prepoznani kot »ključni nacionalni deležniki« (National Key Stakeholders – NSK), od znanstvenih raziskovalcev, financerjev raziskav do današnjih ali potencialnih uporabnikov.

V pomoč so bili pri prepoznavanju in razvrščanju pomembnih družbenih izzivov in raziskovalnih tematik za Slovenijo, prispevali so tudi komentarje o financiranju, povezanosti znanosti in politik (science-policy interface) in vprašanjih vezanih na implementacijo raziskovanja.

Področje obravnave projekta INSPIRATION je večina udeležencev ocenila kot pomembno in relevantno.

Večina NKS meni, da so vsi družbeni izzivi, ki jih predlaga Evropska komisija, pomembni in hkrati preširoki, da bi bilo mogoče med njimi resnično izbrati. Veliko intervjuvancev je tudi izpostavilo, da je zdravo bivalno okolje krovna tema in ne na enaki stopnji z ostalimi izzivi, zato so jo navajali kot najbolj pomembno.

Ko so bili naprošeni, da izpostavijo tri izzive, je večina navedla blažitev podnebnih sprememb in zdravo bivalno okolje, hkrati pa je predlagala vsaj en manjkajoč družbeni izziv.

Izkazalo se je tudi, da so teme, ki so jih deležniki ocenili kot bolj relevantne ali manjkajoče, najpogosteje vezane na njihovo poslanstvo in delo.

ARRS (Javna agencija za raziskovalno dejavnost Republike Slovenije) ni definirala prednostnih družbenih izzivov, ki naj se jih obravnava v nacionalni raziskovalni strategiji. Financirajo teme, ki jih izključno predlagajo raziskovalne inštitucije same (t.i. pristop od spodaj navzgor).

Iz odgovorov na vprašanja ter diskusijo na konferenci ugotavljamo, da so se deležniki osredotočali predvsem na zelo konkretna raziskovalna vprašanja, ki izhajajo iz njihovega strokovnega delovanja. Predlagane raziskovalne tematike lahko v grobem razvrstimo v 4 skupine, in sicer: 1) tematike povezane z vprašanji načrtovanja in upravljanja rab prostora, še posebno v povezavi z bottom-up procesi in regulacijo načrtovanja, prostorske koordinacije politik ter celovitosti načrtovalskih in razvojnih pristopov, ki povezujejo vse relevantne vidike in sektorje. 2) tematike povezane s problematiko podnebnih sprememb in njihovih vplivov na situacijo v Sloveniji, s posebnim poudarkom na vprašanjih poplavne varnosti, preskrbi s pitno vodo in nevarnosti erozije. 3) tretji večji sklop tematik se navezuje predvsem na zagotavljanje varne (samo)preskrbe s hrano, ki predstavlja eno ključnih vprašanj s katerimi se trenutno spopada tako stroka kot tudi politika v Sloveniji, ki je trenutno na stopnji odločitev o integriranem kmetijstvu, ekološki proizvodnji in promociji lokalnih proizvodov. Manjka torej prenos iz teorije v prakso. 4.) tematike povezane z učinkovitostjo upravnih postopkov.

Definicija znanstvenega znanja, njegove uporabe in uporabnosti pri njihovem delu se razlikuje glede na področje intervjuvančevega vsakodnevnega dela. Tisti, ki so vključeni v znanstveno delo, bolj uporabljajo znanstvene rezultate in cenijo rezultate, ki so na voljo, medtem ko intervjuvanci iz prakse ocenjujejo, da znanstveni rezultati niso neposredno uporabni za njihove potrebe, jih je težko razumeti in da obstaja potreba po neke vrsti “prevoda”, da bi postali uporabni na izvedbeni ravni v realnem življenju.

Večina odgovorov kaže, da je zelo težko vplivati na izbor znanstveno raziskovalnih politik/agend v Sloveniji. Dober primer politike, ki je učinkovito uporabila znanstveno raziskovanje za pripravo politike (navedlo več intervjuvancev), sta Strategija razvoja Slovenije in Strategija prostorskega razvoja Slovenije.

Odgovori neznanstvenega sektorja kažejo, da na splošno niso vključeni v oblikovananje znanstveno raziskovalnih vprašanj, nekateri od njih so vključeni v znanstveno raziskovanje (neposredno ali posredno), vendar so večinoma navajali, da so sintetizirali/povzemali znanstveno znanje, da so ga prilagodili svojim delovnim procesom. Večina odgovorov je pokazala, da v Sloveniji ni dokumenta, ki bi predpisal proces prenosa od znanosti do politike ali obratno. Vseeno je bila slovenska Strategija pametne specializacije izpostavljena kot možen primer takega dokumenta.

Glavni nacionalni financer bazičnih in aplikativnih raziskav, ki so ga navajali intervjuvanci, je ARRS. Ima različne sheme financiranja, ki se lahko uporabijo za raziskovanje tematik INSPIRATION. Trije najpomembnejši raziskovalni programi so: temeljni, aplikativni in bilateralni. Mehanizem financiranja ARRS ne temelji na strateški raziskovalni agendi, sredstva se razporejajo glede na izražen raziskovalni interes preko javnega razpisa. ARRS neposredno financira tudi različne raziskovalne skupine na inštitucijah in univerzah skladno z njihovimi raziskovalnimi programi. Raziskovalci, ki izpolnjujejo stroge vstopne pogoje, ki temeljijo na preteklem raziskovalnem delu in publiciranju, lahko pridobijo financiranje. Drugi, vključno s končnimi uporabniki, nimajo veliko vpliva na raziskovalne tematike. To zožuje nabor raziskovalnih tem.

Tudi nekatera ministrstva so-financirajo določene tematike v sodelovanju z ARRS v obliki Ciljnih raziskovalnih projektov.

Na pod-nacionalni ravni ni sistematičnega financiranja. Edini financerji, ki občasno financirajo tematike vezane na INSPIRATION, so večje občine, vendar je financiranje tudi v tem primeru vezano na njihove specifične problem in ni načrtovano vnaprej.

Drugi najpomembnejši vir financiranja za slovenske družbe in organizacije so različni programi, ki jih financira EU, npr. Horizon 2020, 7FP, Interreg, ESPON itd. Za nekatere znanstvene deležnike so to celo najpomembnejši viri financiranja.

Za povečanje dodane vrednosti finančnih virov je večina intervjuvancev navedla potrebo po zmanjšanju administracije in pospešitvi izplačil. Rezultati številnih EU in nacionalnih projektov bi morali biti bolje diseminirani in uporabljeni v praksi tako na nacionalni kot lokalnih ravneh tudi po zaključku projektov. Projektni rezultati bi morali biti “prevedeni” v uporabnikom razumljiv jezik in obliko (poenostavitve za splošno javnost).

Da bi dosegli integrirane pristope in da bi najbolje zasnovali in vodili možnosti financiranja, bi morali različni sektorji bolje sodelovati in koordinirati raziskovalne potrebe. To je zlasti pomembno za potrebe interdisciplinarnega raziskovanja, ker nobeden od sektorjev sam ne definira medsektorskih tematik in jih tako ni pripravljen financirati. Več intrevjuvancev vidi prostorsko načrtovanje kot orodje za učinkovit interdisciplinaren pristop in prostor kot okvir za medsektorsko sodelovanje.

13.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for Slovenia. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation”.

The information was gathered according to the INSPIRATION document D2.3 “Template for national information collation” following this procedure:

- stakeholder analysis and selection of about 40 National Key Stakeholders;
- Invitations sent to selected National Key Stakeholders
- Interviews with responding stakeholders (14 interviews carried out in a first phase (Details are provided in Annex I.)
- The desk study was / based on documents as suggested by NKS and review of interview documents (Annex II).
- Organization of a 1-day national workshop reviewing and synthetizing the collected information for the D 2.4 as well as other open questions related to the SRA. All selected National Key Stakeholders were invited to participate. (Minutes from Workshop are provided in Annex IX). National event in Slovenia was quite late (10th december) since it was planned to be based on almost all questionnaires allready filled-in. We prepared D2.4 before the conference but mostly, we prepared a summary of the finding from the desk work and the questionnaires for the conference, which was presented there and commented widely by stakeholders. The D2.5 was then compiled based on the comments and suggestions from the conference findings. The conference was made in a way of a public hearing, simmillar as for spatial planning documents to ensure a true bottom up process.
- Additional interviews with National Key Stakeholders (all together 19 NKS were interviewed (Details are provided in Annex I.)
- Deliverable 2.5 was sent into a review to several stakeholders. Only four responded with comments in time. Those four were Univesity of Ljubljana, Faculty of Architecture, Chamber of Architecture and Spatial planning of Slovenia, City of Ljubljana and Town and Spatial Planning Association of Slovenia. In comments most appreciated the work done in the project and didn’t have mayor objections regarding the content of the report. There were some minor comments: e.g. the problem of flooding repeats in different research questions, make it one and make it more important (updated, done), the problem of clean drinking water supply should be more important. They also expressed, that the topics might be too “globaly” oriented and that it would be more helpful for Slovenia if they were more localized.

13.3 Research and Innovation (R&I) needs

13.3.1 Societal challenges and needs

General observations

The majority of the NKS consider all the societal challenges suggested from the European Commission equally important as well are too wide to really choose among them. Many of the interviewees also exposed, that healthy living environment is a cover topic and not in the same level with other challenges and therefor regarded as most important.

When asked to choose just three, most of them decided for climate change mitigation and healthy living environment but at the same time also proposed at least one missing societal challenge.

It is also possible to observe that topics defined by stakeholders as more relevant or missing are most often linked to their mission and work.

Proposed societal challenges	**Decisions about 3 main proposed challenges from NKD**															
Contribute to climate change mitigation and take into account the soil and environment in the effort of societal adaptation	**x**	**x**	**x**	**x**	**x**	**x**		**x**	**x**	**x**	**x**		**x**	**x**	x	**x**
Contribute to a healthy living environment		**x**	**x**		**x**	**x**		**x**	**x**	**x**		**x**		**x**	x	**x**
Efficient use and reduction of raw material and (natural) resource consumption					**x**					**x**	**x**	**x**		**x**	x	**x**
Contribute to food security and food safety								**x**	**x**		**x**				x	**x**
Ensure secure supplies of safe drinking water	**x**			**x**			**x**								x	**x**
Ensure secure infrastructure.	**x**		**I**			**x**									x	
Secure energy supply and distribution			**I**	**x**											x	

Additionally proposed societal challenges:

- “good water status” (EU Water Framework Directive),
- flood risk reduction, (Flood Directive)
- land use and spatial planning governance,
- effective balance of the level of regulations,
- The protection of ecosystem services
- Urban renewal, regeneration, rehabilitation
- The revitalization / revitalization of undeveloped and abandoned areas
- Concepts for the identification and evaluation of significant impacts
- The opportunities for innovative technologies in land use
- management - social aspects are often underestimated in terms of the necessary social change for real change
- The improvement of water and soil
- Sustainable agriculture
- Environmental Health
- Preservation of agricultural and cultural landscape, terraced landscapes
- Sustainable and integrated spatial planning
- disaster risks and risk prevention
- Perception of the landscape and environmentally friendly tourism
- Policy on land management and land use

The National Research Agency has not defined any priority societal challenges to be addressed in the national research agenda. They fund topics that come entirely from the research institutions themselves (bottom-up approach).

13.3.2 Topics / research needs to include in the SRA

The range of the topics collected from the answers to the questionnaires and discussion at the conference show that the stakeholders focused primarily on very specific research questions arising from their professional activity, however the lack of the cross sectoral approach and the understanding of the spatial aspects was also expressed by most of the participants. The proposed research topics can be roughly divided into 4 groups, namely: 1) topics related to the issues of planning and management of land uses, especially in conjunction with the bottom-up processes and control planning, spatial policy coordination and the integrity of the design and development approaches linking all relevant aspects and sectors. 2) Topics related to climate change issues and their impact on the situation in Slovenia, with a special emphasis on issues of flood safety, the supply of drinking water and the risk of erosion. 3) The third major set of topics is related primarily to the provision of safe (only) food, which is one of the key issues which are currently facing such a profession as well as politics in Slovenia, which is currently at the stage of the decision on integrated farming, organic production and promotion of local products. Accordingly, there is the transfer of theory into practice. 4) Topics related to the efficiency of administrative procedures.

The important outcome is also a recognition of the absence of strategic research agenda. The funding mechanism of the National research agency is not based on the strategic research agenda, but they distribute funds according the expressed research interest via public tenders. Researchers that fulfil strict entrance criteria based on previous research work and publicity can win funding. Others don’t have much influence on the research topics. That narrows the scope of research topics.

SI-1 Issues of (Post) Sustainable spatial development for better land management

In Slovenia (and probably many other countries) spatial planning lost effectiveness of the response to the current problems and social challenges. It is particularly evident as a large gap between the strategically accepted values and paradigms, and practical solutions and policies on an implementation level.

Due to the growing complexity and speed of the changing processes related to the particular context of the area is more and more important to be able to have a real-time and flexible response to problems and opportunities. There is a lack of suitable methods and approaches for the recording and transmission of needs the situation in real time and dynamic change contexts at the micro level as well as instruments to translate them to the spatial planning and (post) sustainable development for environmental and living quality on all levels.

Specific research questions:

Demand

- **Comprehensive understanding of the concept of healthy living environment**

  There is a lack of comprehensive understanding what the healthy living environment is, how it is related to the spatial, social and other contexts and, what are the aspects and relationship between urban development and health/wellbeing.

  Why: This kind of knowledge, bringing together space and health issues, has a direct impact on the definition of criteria, indicators, standards, regulations and guidelines for spatial planning land management.

- **Spatial planning approach for new societal challenges**

  It is necessary to check and asses the current planning system and planning instruments in terms of their relevance and responsiveness to important processes in Slovenia, the EU and beyond, such as demographic changes, technological and economic development, political change, climate change and others.

  Why: To improve modern approaches to planning is necessary to deepen the understanding of the importance of spatial aspects of the development and opportunity as the factual context and consequences of media development decisions all sectors.

- **Spatial development coordination of public management/governance**

  We have too little knowledge of how does the coordination of spatial development of services of general interest and governance work, when and how to actually set up efficient coordination between different levels and what are the reasons that the process is not successful?

  Why: To determine what the effective mechanisms are and what are the obstacles and problems.

- **Understanding possible roles, benefits, levels and types of regulation for comprehensive development**

  For effective and balanced planning and management of development, regulative approach has an important role that many times is not adequately understood and taken into consideration within Slovenian planning system. That causes great inconsistency and chaotic situation on the level of implementation of different development documents on different levels.

  Why: To consolidate the approaches of public authorities and improve their effectiveness

Net Impact

- **Cross-border supply of services and general economic interest**

  So far we have no information about the types of services that are provided across borders, the number of such services and the number of their users. It is the task of the state and local communities to ensure uniform and equitable access to services of general interest to all citizens. It is important to research the potential users and needs for services as well as state-of the art supply on both sides of the border.

  Why: Failure to comply with a) existing services on the other side of the border, and b) potential service users on the other side of the border leads to irrational supply as too much or not enough providers in the border area or duplication of services. Newly acquired knowledge would be most useful in spatial and regional planning, transport planning (especially public transport) and social care services.

- **Understanding micro and local levels of spatial and social context**

  For evaluation and comprehensive assessment of the situation in the dynamic changes is important to understand the aspects hierarchical interrelation of the scale and criteria and how the actual knowledge from the scale 1:1 can be used in the further processes.

  Why: For the successful implementation of scientific research findings in planning an monitoring practices, it is important to create a model for hierarchical co- dependency of the criteria for spatial evaluation and develop relevant methodologies for interdisciplinary and bottom up approaches.

- **Implementation of the concepts of green infrastructure, nature based solutions and ecosystem services into the urban planning system**

  There is a need for better and more comprehensive understanding what are new and what already established aspects introduced by different concepts of green infrastructure, nature based solutions and ecosystem services, how the are interlinking and how should be incorporated into the sustainable urban planning system

  Why: to improve the cross-sectoral cooperation within urban development

SI-2: Understanding Soil-Land-Water relationship and interdependence for better mitigation of climate change problems

Climate changes in Slovenia and all over the Europe are increasing the danger of floods and landslides affecting both quality of life of people and economy/businesses development. As a frequent natural process it should be better researched and taken into consideration when planning and deciding about the development. The comprehensive understanding about the processed of floods, erosion and landslides should be deepen, and knowledge used for more effective and suitable preparation land use management. Flood risk management plans should be developed as important starting points for sustainable spatial planning for better living quality and safety on all levels.

It is especially important to improve the understanding and knowledge about the flow of groundwater and the impact on all settlements in flood plains.

In Slovenia, half of the population as well as biota depend on water supply from karst aquifer. It is estimated that the current situation at the level of the 2 or 3 out of 10 in terms of protection and the importance of identifying geological and hydrological characteristics of karst in connection with the protection of karst water resources, and that in 10-20 years we can achieve an appropriate level of development of knowledge. Knowledge of the specific characteristics of karst water streams should be taken into account in the planning or statutory protection.The responsibility is on the Ministry of Environment and Spatial Planning as well as on individuals related to different aspects of water supply and their activities.

Specific research questions:

Demand:

- **Drinking water supply**

  It is especially important to improve the understanding and knowledge about the flow of groundwater and the impact on all settlements in flood plains. The responsibility is on public services, administration and the country.

  Why: There are hazards as a privatization of water resources and reduction of standards.

- **Drinking water supply from Karst aquifer)**

  Topic has a high priority and an international dimension because a third of Europe lies in the calcareous many countries are totally dependent on karst water resources, countries such as Austria and Croatia is the karst aquifer to receive 50% of drinking water.

  Why: If nothing will be done many areas may remain without sufficient quantities of quality water resources, there may be the destruction of habitats (including endemic species)

Natural capital

- **Relationship between soil and ground water** and **soil-water management**

  One of the important aspect for food security development is also efficient use of water as a natural resource in food production. Nowadays, the importance of soil water and interaction between the soil and ground water (the agronomic point of view of water) is left behind in research; The topic is important for agriculture and farmers (if not managed properly ground water comes to drought, pollution).

- **Interface of abiotic and biotic environment**

  In deep research of the interface of abiotic and biotic environment and thus how different, specific ecosystems react and respond to different, particular impacts.

  Why: There is still not enough knowledge about many important aspects how abiotic and biotic interface

- **Interrelationship between flooding processes and erosion / landslides**

  The process of interdependence of water erosion and landslides is insufficiently studied and understood. That may lead to more and more problems with flooding and erosion in the future.

  Why: New knowledge will be used for the preparation of development plans and management policies in order to achieve the goal of improving the quality and safety of living at all levels, from the local to the transnational.

Land use management

- **Water treatment plants for agriculture land irrigation;**

  In Slovenia, the lack of research in this area, from the standpoint of the safety of water and consumers' views / users; bad legislation. Unlike some other countries eg. Belgium. Possible / desirable to standardize at EU level. Partners: EU, MAFF, TP / utility companies (selling water); farmers (buying water for irrigation at a better price). Legal basis: Water Framework Directive, the Water Act, the Regulation on the entry of substances into the soil, the Rural Development Programme 2014-2020.

  Why: More water would be purified and used in this resource would be less pressure on managed resources.

Net Impacts

- **Technology of irrigation and fertilization adapted to the structure of the soil and the type of product and usage and increase of the humus storage.**

  Research and development of the technology of production on various substrates

  Why: to gain a knowledge what is the optimal land use for the area, how to adapt technology, no escrow fertilization.

- **Prevention of the erosion of fertile soil - adaptation to climate change**

SI-3 Contributing to food security and safety

Slovenia is in a process of deciding about the approach and policies for food security and safety, especially in the way of local self-suply. It has to define the priorities of the development and responsibilities of producers and user as well as spatial implications in terms of integration of sustainability parameters such as nature based solutions, locality, land management, land use changes and competition as well as cultural landscape protection and social integration. There is a strong need for comprehensive understanding and research of different background aspects related to the food production development, from technological and spatial, to socio-political, cultural, demographic and ecomnomoc.

Specific research questions:

Demand

- **Systematic approach on integrated farming, organic production and local products.**

  Why: The topic is not systematically approached, transfer from theory into practice is missing and many important aspects are not addressed and resolved. The new knowledge is needed to be used for better land use and land management decisions as well as to be incorporated into spatial planning system-

Land management

- **Adressing the issues of the overgrowth of the agricultural areas**

  There is a strong need for better understanding the process and background aspects of the ovewgrowth of the agricultural areas by forest

  Why: to develop the methodology for clear definitions and decisions about forest land use and the agricultural land use areas and instruments for managing the processes.

- **Land use and identity of terraced landscapes**

  Agricultural terraces, which are a characteristic Mediterranean landscape element are facing declining role of agriculture production. With increased social mobility and an ageing and insufficient agricultural workforce they have lost their former role and functions. The previous variety of agricultural types of land uses is now almost entirely replaced by meadows.

  Why: To find suitable and comprehensive solutions how to re-activate those land uses and landscape identity.

Net impacts

- **Develop the methodology for environmental impact assessment in relation to mitigation measures on agricultural land**

  Why: to improve the environmental aspects of agricultural activities

- **Develop the effective approach for presentation of the topic to the users**

  Why: to raise awareness about problems and more suitable solutions?

- **What are the impacts of different interventions** (for example industrial sites) on **agricultural land and the environment**?

  Why: to redice negative impacts

- **The impacts of permeability in the agricultural production**

SI-4 Efficiency of administrative procedures, information systems and accessibility of data

There are many problems related to data collection, use and exchange dispersed database building and different systems to difficulties of accessibility of the data although many data collection and measurements are carried out, even funded by public money. In Europe, there are also different metering systems, which are not harmonized. This affects the research, planning and management possibilities within entire country and Europe in general, reduce its competitiveness and may also affects the safety of people.

To efficiently implement sustainable development decisions and solutions in practice, suitable processes, mechanisms and tools are needed to respond and fit in the particular socio-economic and spatial context. There is a strong need to refresh and deepen the understanding of the interconnectedness and interdependence of different topics and aspects of (post) sustainable development and its integration into the inherent spatial and social frameworks as well as already established processes for participation, inclusiveness and communication.

The knowledge gained could be used to improve the effectiveness of policies, planning and management of space, and thus the overall situation of the quality of space and the environment.
One of the main obstacles for better administrative procedures efficiency in Slovenia is also its procuremet system using the method of the lowest price instead of quality.

Specific research questions:

Demand:

- **Improving data accesability and exchange in Slovenia and Europe**

  Beside official state agency there are many stakeholders who collect GIS data on national and EU level. Many of them, even if funded by state or EU are difficult to access. It is necessary to change the approach of data owners to seek of their data, how to sync different databases.

Why: Researchers don't have enough accurate data, and thus their research cannot be effective and competitive enough. Data maintenance is expensive, so also from this reason is necessary to establish a common methodology for the exchange of the information and data

Land management

- **Issues of effective implementation and policies.**

  Reaserch for understanding reasons and backgrounds for the gap between declarative standpoints and practical solutions.

  Why: to overcome the circumstances that cause the gap between strategy (vision) and implementation of the proposed solutions and improve land management.

- **Processes, mechanisms and tools for exercise paradigm of (post) sustainable development at all levels of spatial planning and implementation.**

  The interdisciplinary research is needed to re-define the spatial aspects and interactions of different development paradigms (such as energy efficiency, rational use of resources, healthy and high-quality living environment ....) and to determine appropriate measures and tools to ensure public good, mechanisms for assessment of suitability and effectiveness as well as integration within the framework of comprehensive spatial planning.

  Why: Otherwise, the gap between declarative and implemented will increase and the society's trust in the effectiveness of spatial planning will decline.

Net impacts

- **Importance of bottom up initiatives in land use and spatial planning**

  There is a strong trend of bottom up activities that is also supported on declarative level but we do not have enough knowledge and understanding about the reasons and backgrounds for their development nor about the long term consequences.

  Why: to improve the approach and effectiveness of inclusive planning

- **Methods of effective communication and public and political awareness**

  Why: It is very important to present scientific knowledge and achievements to the end user in a way that convinces the relevance of scientific research for better solutions.

- **Improving the procurement system in Slovenia using the method of the lowest price instead of quality**

  A problem has a more national character, but also some other countries may be faced with similar problems. The situation is very problematic and therefore has its solving high priority. It affects the quality of research, including in the context of monitoring which seeks to introduce qualitative criteria.

  Why: The consequences are the decline in quality, loss of competitiveness, lengthy procedures and high consumption of time, additional costs for correcting bad performances. Topic to be financed by Slovenia, but also the EU.

13.4 Experiences regarding connecting science to policy/practice

13.4.1 Use of knowledge

Definition of scientific knowledge, use of scientific knowledge and the usefulness in their work differs by the field of interviewee's daily work. Those who are involved in the scientific work, use scientific results more and value the available results, while interviewees that work in practice estimate, that scientific results are not directly applicable to their needs, difficult to understand and that there is a need for some kind of "translation" to become useful in the implementation level in real life.

Similar division goes to the use of sources of the scientific knowledge, where those who work in the scientific field use all of the sources except newspapers and television, while practitioners use mostly reports, consultants, and examples and experienced from Slovenia and abroad websites and newspapers.

Good example of a policy that effectively used scientific research to prepare a policy (listed by several interviewees) is a "Spatial development strategy of Slovenia".

13.4.2 Possibilities to set the agenda

Most of the answers indicated that is it very difficult to influence the setting of the scientific research policies/agendas in Slovenia. The funding mechanism of the National research agency is not based on the strategic research agenda, but they distribute funds according the expressed research interest via public tenders. Researchers that fulfil strict entrance criteria based on previous research work and publicity can win funding. Others don't have much influence on the research topics. That narrows the scope of research topics.

13.4.3 Science – policy – practice

Answers from the non-science sector indicated, that generally they are not involved in the formulation of the scientific research questions, some of them are involved in the scientific research (directly or indirectly), but they mostly indicated that they are synthesizing /wrapping-up of scientific knowledge in order to fit their working processes. They evaluated technical topics related to investment are successfully covered in research, while issues related to social networking and empowerment are not.

Most answers indicated that in Slovenia, there is no document that would prescribe the process from Science to policy or vice versa transfer. However, one respondent indicated, that Strategy for Smart specialization of Slovenia could be interpreted as such document.

13.5 National and transnational funding schemes

13.5.1 Funding schemes and possibilities for research funding

The main national funder of basic and applicative scientific research recognised by respondents is ARRS (Javna agencija za raziskovalno dejavnost Republike Slovenije/ Slovenian research agency). They have different funding schemes, which can be used for research of INSPIRATION topics. Three most important are basic, applicative and bilateral research programmes. Also some ministries co-finance specific topics in collaboration with the Slovenian research agency in the form of Targeted research projects.

On the subnational level there is no systematic funding detected. The only funders that occasionally finance INSPIRATION related topics are bigger municipalities, but also in this case it is usually connected with the specific problems and not planned in advance.

The second most important source of funding for companies and organisations from Slovenia are different EU funded programmes, e.g. Horizon 2020, 7FP, Interreg programmes, ESPON, etc. For some scientific stakeholders this are even the most important source of funding.

To increase the added value of financial sources, most of the respondents indicated the need for less administration and to speed-up the reimbursement process. The results of many EU and national projects should be better disseminated and used in practice on both national and local levels even after the end of the projects. Project results should be “translated” into user friendly language and form (simplification for general public).

To best set up and govern funding options, different sectors should better co-operate and co-ordinate research needs. This is especially important for interdisciplinary research needs, since no sector by it’s own really detects cross-sectoral topics and is therefore not willing to finance. Several contributors see Spatial planning as a tool for effective interdisciplinary approach and space as a framework for cross-sectoral co-operation.

FUNDING possibilities on local level

Based on a desk research, but also based on the results from the questionnaires Municipalities in Slovenia in generally do not finance research projects. They mostly focus on solutions to specific problems, assessment of impacts of proposed developments and to study different inventories about the state of the art in land use, demography, all as a input for new or updated version of spatial planning documents.

FUNDING possibilities on national level

There are two main funding possibilities for the research on SSW systems and Land use management topics in Slovenia. The main source is the Slovenian Research Agency and the second source are different ministries who are funding mainly topic based research related to their sector.

Slovenian Research Agency (Agencija za raziskovalno dejavnost Republike Slovenije – ARRS) is an independent public funding organisation that performs tasks relating to the National Research and Development Programme and creation of European Research Area. They »provide framework for scientific research within the national budget and other sources, promote high quality scientific research in Slovenia and its application, foster internationally comparable evaluation standards in Slovenia, provide the transparency of organising research community in Slovenia, promote international research cooperation, analyse R&D activities and provides science policy expertise.

Of the total budget of around 136 MIO EUR in 2014, 60% were dedicated to financing research institutions in Slovenia and about 35% or 47 MIO EUR to »competitive« research which includes public tenders for different research projects. ARRS have 4 types of research tenders:

- For basic research projects
- For applicative research projects
- For targeted research projects and
- Funding of post-PhD studies.

Tenders for basic research projects, for applicative research projects and for post- PhD studies are funded by research areas. During the tender, applicants submit project ideas inside their research areas (e.g. Social studies, Natural Sciences, etc). Project proposals are then evaluated by international reviewers and by scientific excellence of project team.

The best possibility to cover the research needs from the real needs of different sectors/ministries via the ARRS is a tender for Targeted research projects. The INSPIRATION bottom-up approach of research needs is compatible with the tender for the Targeted research projects. Targeted research projects were highly synchronized in the process of the preparation of the Strategy of the development of Slovenia (adopted in 2005), but in the recent years, Ministries lack proper planning in order to create their own research agenda. In the INSPIRATION scope only the Ministry of agriculture and Ministry of Economy remained strong contacts with the ARRS and prepare their own research needs to be tendered via Targeted research projects.

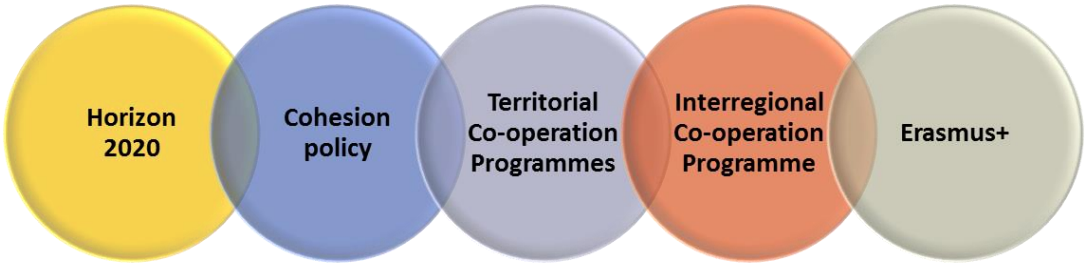


Figure 1: funding possibilities on a EU level (source: UIRS).

FUNDING possibilities on a EU level

The EU is funding and co-funding projects to foster and support tackling the problems in scope of the INSPIRATION project through various programmes:

- **Horizon 2020** is a financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. With a budget of 80 billion EUR and running from 2014 to 2020, the EU's new programme for research and innovation is part of the drive to create new growth and jobs in Europe.
- **Cohesion policy 2014-2020** ("The second programming period") has two main goals for 2014-2020, investments for growth and jobs, and European territorial co-operation. Two structural funds (European Regional Development Fund (ERDF) and European Social Fund (ESF)) and Cohesion Fund are set up to ensure reaching those goals, with the total budget of 336 billion EUR.
- **Territorial Co-operation Programmes** (ETC; also known as Interreg) include Cross-border and Transnational Co-operation Programmes:
    - **The Cross-border Co-operation Programmes** connect neighbouring countries and regions and have a budget of 5,6 billion EUR on EU wide level. Slovenia (i.e., its regions) can co-operate with Croatia, Austria, Hungary and Italy.
    - There are several **Transnational Co-operation Programmes** active, among others Central Europe Programme, Adriatic-Ionian Programme (previously South-East Europe), Danube Programme (previously South-East Europe), Med Programme, Alpine Space Programme, Atlantic Area Programme and North West Europe Programme. The total budget is 1,8 billion EUR. Slovenian partners can participate in 4 programmes: Alpine Space Programme, Danube Programme, Adriatic-Ionian Programme and Med Programme.

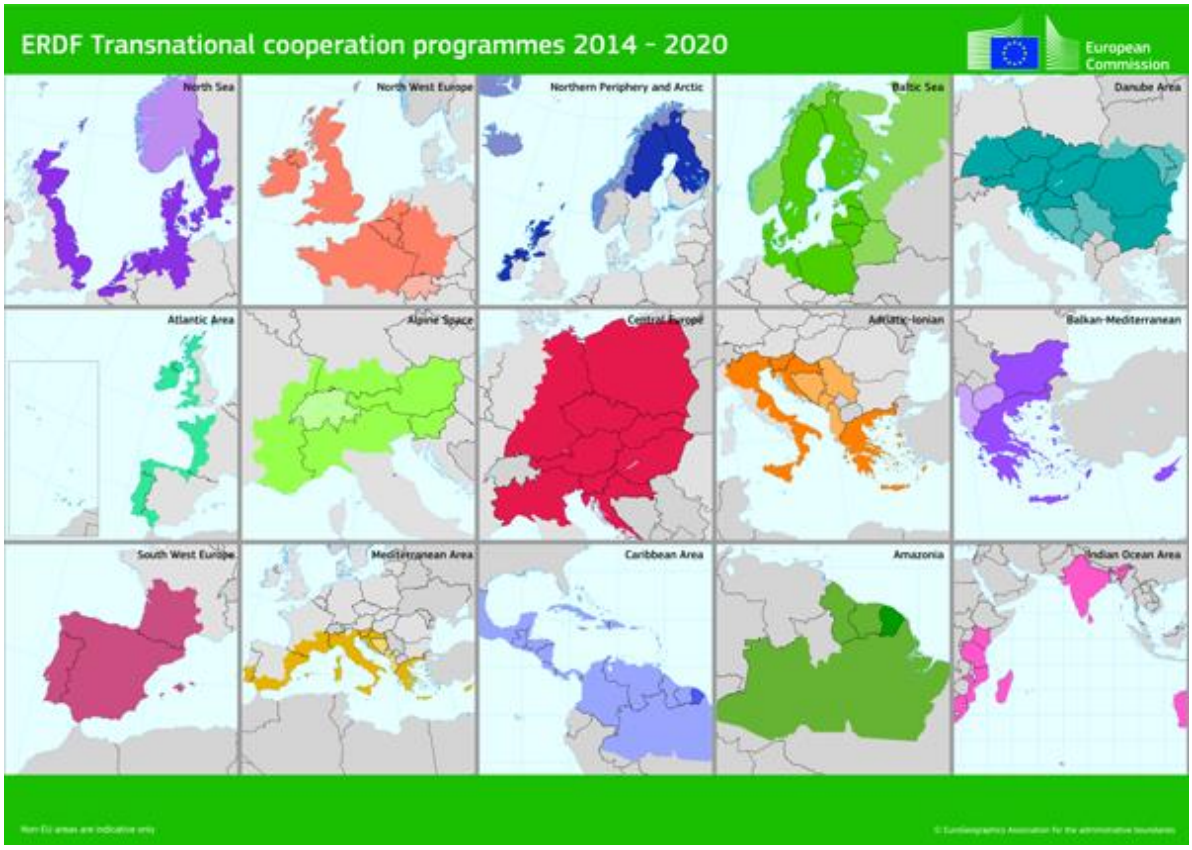


Figure 2: Transnational cooperation programmes in programming period 2014-2020.

(source: http://ec.europa.eu/regional_policy/en/policy/cooperation/european-territorial/trans-national/)

- **Interregional Co-operation Programmes** are pan-european programmes covering all 28 EU Member States, and more. There are 4 interregional programmes active, funded from ERDF: Interreg EUROPE (359 million EUR), INTERACT (39 million EUR), URBACT (74 million EUR) and ESPON (41 million EUR).
- **Erasmus+** is a new EU programme for education, training, youth and sport for 2014-2020. It will provide grants for individuals, support transnational partnerships among education, training and youth organisations and support grassroots projects and cross-border challenges. It has a budget of 14,7 billion.

Source:

https://www.arrs.gov.si/sl/

http://ec.europa.eu/regional_policy/en/policy/cooperation/european-territorial/trans-national/

R&I funding options collated for country:	Slovenia

	Name*	**Research and Innovation funder****	**What and/or whom do they fund?*****	**More info********
Regional /municipal				
1	Strokovne podlage za pripravo prostorskih aktov - Expert basis for spatial plans	Municipalities, especially bigger ones e.g. Ljubljana, Maribor, Kranj, Celje and Koper	expertise for the preparation of spatial development plans, depends on the special needs.	No planned tenders, usually in the first stages of the preparation of new spatial development plans http://www.ljubljana.si/si/mol/razpisi-razgrnitve-objave/
2	Strokovne podlage za pripravo regionalnih razvojnih programov - Expert basis for Regional development plans	Regional Development Agencies	expertise for the preparation of regional development plans, depends on the special needs, but spatial topics are important and included.	Slovenia does not have regions, only statistical, but do have regional development agencies which sometimes tender for specific topics, similar as municipalities when preparing regional development plans. Most were prepared for the period 2014-2020
National				
3	basic research projects	Javna agencija za raziskovalno dejavnost Slovenije – Slovenian Research Agency	funded by research areas, proposals made by researchers, funds allocated to cover all general research fields	https://www.arrs.gov.si/sl/ https://www.arrs.gov.si/sl/progproj/rproj/predstavitev.asp
4	applicative research projects	Javna agencija za raziskovalno dejavnost Slovenije – Slovenian Research Agency	funded by research areas, proposals made by researchers, funds allocated to cover all general research fields	https://www.arrs.gov.si/sl/ https://www.arrs.gov.si/sl/progproj/rproj/predstavitev.asp

5	targeted research projects and	Javna agencija za raziskovalno dejavnost Slovenije – Slovenian Research Agency	Targeter research projects, bottom-up approach to finance real needs of Ministries /sectors. Currently only Ministry of agriculture, forestry and food have a long-term contract for the period 2011-2020, then each year they collect suggestions for relevant topics	https://www.arrs.gov.si/sl/ https://www.arrs.gov.si/sl/progproj/crp/ http://www.mkgp.gov.si/si/javne_objave/javni_pozivi/poziv_za_posredovanje_predlogov_prednostnih_raziskovalnih_tem_zagotovimo_si_hrano_za_jutri_2011_2020_v_letu_2016/
6	Funding of post-PhD studies	Javna agencija za raziskovalno dejavnost Slovenije – Slovenian Research Agency	funded by research areas, proposals made by researchers, funds allocated to cover all general research fields	https://www.arrs.gov.si/sl/
European/International				
7	Horizon 2020	EU commision	a financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. With a budget of 80 billion EUR and running from 2014 to 2020, the EU's new programme for research and innovation is part of the drive to create new growth and jobs in Europe	https://ec.europa.eu/programmes/horizon2020/

8	Cohesion policy 2014-2020	EU commision	, investments for growth and jobs, and European territorial co-operation. Two structural funds (European Regional Development Fund (ERDF) and European Social Fund (ESF)) and Cohesion Fund are set up to ensure reaching those goals total budget of 336 billion EUR	http://ec.europa.eu/regional_policy/sl/funding/erdf/
9	Territorial Co-operation Programmes – The Cross-border Co-operation Programmes	EU commission throught involved countries	connect neighbouring countries and regions and have a budget of 5,6 billion EUR on EU wide level. Slovenia (i.e., its regions) can co-operate with Croatia, Austria, Hungary and Italy.	http://www.ita-slo.eu/ http://84.39.218.255/si2/ http://84.39.218.252/si2/ http://84.39.218.249/si2/ http://www.eu-skladi.si/
10	Territorial Co-operation Programme – INTERREG ADRION	EU commission throught involved countries (Managing Authority and Joint Technical Secretariat)	3 priority axes and horizontal dimension. They finance 4 EU Member States (Croatia, Greece, Italy and Slovenia), 3 candidate countries (Albania, Montenegro, Serbia) and 1 potential candidate country (Bosnia and Herzegovina)	http://www.adrioninterreg.eu/

11	Territorial Co-operation Programme – ALPINE SPACE	EU commission throught involved countries (Managing Authority and Joint Technical Secretariat)	Co-operation programme for the Alpine region. It provides a framework to facilitate the cooperation between economic, social and environmental key players in seven Alpine countries, as well as between various institutional levels such as: academia, administration, business and innovation sector, and policy making	http://www.alpine-space.eu/
12	Territorial Co-operation Programme – CENTRAL EUROPE programme	EU commission throught involved countries (Managing Authority and Joint Technical Secretariat)	Regional cooperation among nine central European countries: Austria, Croatia, the Czech Republic, Hungary, Poland, Slovakia and Slovenia, as well as parts of Germany and Italy. 4 thematic priorities	http://www.interreg-central.eu/
13	Territorial Co-operation Programme DANUBE Transnational programme	EU commission throught involved countries (Managing Authority and Joint Technical Secretariat)	Promotes economic, social and territorial cohesion in the Danube Region through policy integration in selected fields. Cca 263 Mio. EUR budget	http://www.interreg-danube.eu/
14	Joint Programming Initiative Urban Europe	Member States commit to Joint Programming Initiatives (JPIs)	open for consortia of the contributing member states, in 2016 first time also for applicants from Slovenia	http://ec.europa.eu/research/era/joint-programming_en.html https://www.arrs.gov.si/sl/medn/urbana/obvestila/15/razpis-urbana-europa.asp

15	Interreg EUROPE	EU commission	Helps regional and local governments across Europe to develop and deliver better policy. Eligible all EU member states plus Norway and Switzerland. Cca. 359 Mio budget.	http://www.interregeurope.eu/
16	INTERACT	EU commission	to simplify/harmonise approaches, to improve thematic expertise and to increase knowledge of new and existing tools for cooperation Cca. 39 Mio. budget	http://www.interact-eu.net/
17	URBACT	EU commission	Foster sustainable integrated urban development in cities across Europe. to enable cities to work together and develop integrated solutions to common urban challenges, by networking, learning from one another's experiences, drawing lessons and identifying good practices to improve urban policies Cca. 74 Mio. budget	http://urbact.eu/
18	ESPON	EU commission	promoting and fostering a European territorial dimension in development and cooperation by providing evidence, knowledge transfer and policy learning to public authorities and other policy actors at all levels Cca. 41 Mio. budget	http://www.espon.eu/main/

19	LIFE +	instrument under Horizon 2020	EU's funding instrument for the environment and climate action, to contribute to the implementation, updating and development of EU environmental and climate policy and legislation	http://ec.europa.eu/environment/life/funding/lifeplus.htm
20	COST - European Cooperation in Science and Technology	EU	European framework supporting trans-national cooperation among researchers, engineers and scholars across Europe. funds pan-European, bottom-up networks of scientists and researchers across all science and technology fields	http://www.cost.eu/
21	Erasmus+	EU	a new EU programme for education, training, youth and sport for 2014-2020. It will provide grants for individuals, support transnational partnerships among education, training and youth organisations and support grassroots projects and cross-border challenges. It has a budget of 14,7 billion	http://www.erasmusplus.si/

Include full name and (if available)
* acronym of the R&I funding option
Include name of the R&I
** funder/funding institute or authority
** Detail which type of programme, projects, partners or
* infrastructures they are funding
** Include weblink and/or other reference for more information
** on this R&I funding option

SYNTHESIS OF THE ANSWERS ABOUT FINANCIAL SCHEMES AND OPTIONS FOR FUNDING RESEARCH FROM INTERVIEWS

For added value of the various financial resources is necessary to

- significantly reduce bureaucratic requirements for applications, including the required particulars
- reduce administration and control and to increase confidence and responsibility
  use should be more American approach = less administration, and make the results available to all researchers, greater confidence
- Avoid complicated and confusing tender documentation
- reduce the backlog of reimbursement - for smaller institutions is very problematic to store cash advance
- promotion of pure research, without co-financing, but with the inclusion of the economy
- improve coordination of financiers and combine financing to larger and more relevant projects
- To regulate the financing of multi-sectoral projects - who announces topics and financed?
  Strengthen the financing of large-scale, comprehensive, applied projects, in which the participants (who would otherwise compete) can be linked
- Strengthen the bottom-up approaches
- integrate researchers and their results in the formation of policies, strategies and spatial planning
- Using research materials for the national strategy and the transfer of good practices at municipal levels.
- Translating the results of research projects to understand, non-technical language that could be used for policy documents
- more practically orientated research by testing in practice, methodology
- clearly demonstrate the significant financial benefit, win-win situation

13.5.2 Gaps in financial resources for research

Areas of research and innovation are not yet covered by current funding mechanisms that respondents indicated are: Incorporating weather info decision making systems (for floods, traffic, etc.) Land use topology, building typology, linking risks and responsibilities in mayor unplanned events. It is indicated that the whole range of spatial development topics is neglected mostly on higher administrative levels (regional and sub-regional levels in Slovenia). Karst specific processes and behaviours were mentioned, too. Connection between space and health issues, healthy aging and demographic issues.

For integrated approaches, different sectors should better co-operate and co-ordinate research needs. This is especially important for interdisciplinary research needs, since no sector by it's own really detects cross-sectoral topics and is therefore not willing to finance. Several contributors see Spatial planning as a tool for effective interdisciplinary approach and space as a framework for cross-sectoral co-operation.

SYNTHESIS OF THE ANSWERS ABOUT RESEARCH FUNDING GAP - overlooked TOPICS

The entire range of spatial research topics is very poorly financed

- Very poor recognition of space as a common integration framework / as media of integration of all sectors to attain the objectives of development interventions and activities
- Integrate content of spatial planning as a transdisciplinary rather than interdisciplinary
- misunderstanding and ignorance of the importance of integrated approaches (the prevalence of sectoral thinking patterns)
- To improve the funding of integrated approaches is necessary to better define targets in calls for funding and change the research paradigm
- there should be more integration between sectors at all levels for drawing up a common agenda, the creation of common goals and interests with regard to research – there is a need to build a horizontal, interdepartmental agenda
- Understand, develop and implement the necessary various coordination mechanisms
- The problem lies in the fact that it is sometimes difficult to specifically evaluate the results and measure

FINANCING GAPS – ADDITIONAL PROPOSALS FOR FINANCING RESEARCH TOPICS FROM STAKEHOLDERS

- Comprehensive interdisciplinary research,
- Basic Research
- transdisciplinary research of the philosophical, ethical, conceptual research questions
- Development of quality criteria and indicators
- studies of specific processes and response characteristics of Karst
- research in the field of integration of health and opportunity
- The quality of opportunity
- The subjects of typology of land use,
- The subjects of the typology of construction,
- The subjects of terraced landscapes
- The subjects of risk indicators and the change of responsibility for the events
- The subjects of spatial development and building land

13.6 Other remarks made by interviewees

There were remarks regarding the complicated process for new projects application. The low percentage of acceptance of project proposals is an indicator especially for SME to rather focus on core business and not to participate in EU research projects, even if the experience in those who already participated is good. There was a suggestion to implement a two stage process, where the first stage would be just content oriented.

13.7 Annexes

Annex I: NKS interviews in Slovenia

Stakeholder organisation				Profile INSPIRATION													
Date of interview	Name of the entity **	Country	Contact person*	funder	end user	knowledge provider	national-regional-local authority	university/research institute	SME /consultant	business and industry	NGO	network	other	soil	sediment	water	land use-management
20.11.2015	Town and Spatial Planning Association of Slovenia	SI	dr. Liljana Jankovič Grobeljšek		1	1					1	1					1
10.11.2015	ARRS - Slovenian Research Agency	SI	Tina Vuga	1			1							1	1	1	1
15.9.2015	Ministry of Environment and Spatial Planning, directorate for spatial planning and housing	SI	Tomaž Miklavčič	1	1	1	1										1
9.9.2015	University of Ljubljana - Faculty of Architecture	SI	dr. Alenka Fikfak		1	1		1									1
4.11.2015	Institute for Water of the Republic of Slovenia	SI	dr. Aleš Bizjak		1	1		1								1	
21.10.2015	Lasscan d.o.o.	SI	dr. Lucija Ažman Momirski		1	1			1					1			1
14.9.2015	Urbana Regeneracija d.o.o.	SI	mag. Igor Cotič		1				1								1
23.10.2015	City of Ljubljana	SI	Ivan Stanič	1	1	1	1										1
8.9.2015	City of Kranj	SI	Janez Ziherl	1	1	1	1										1
19.11.2015	Institute for Spatial policies	SI	Marko Peterlin		1	1					1						
16.10.2015	Urban Planning Institute of the Republic of Slovenia	SI	dr. Barbara Goličnik Marušić		1	1		1						1	1	1	1
19.11.2015	Chamber of Architecture and Spatial Planning of Slovenia	SI	dr. Aleš Mlakar						1	1							1
5.11.2015	CGS plus d.o.o.	SI	dr. Alenka Šajn		1	1			1	1						1	
3.12.2015	Biotechnical Faculty, department for agronomy	SI	prof.dr. Marina Pintar			1		1						1	1		
14.1.2016	Ministry of Environment and Spatial Planning, directorate for environment	SI	mag. Vesna Kolar Planinšič	1	1		1							1	1	1	
18.1.2016	Association of Municipalities and Towns of Slovenia	SI	Miha Mohor		1						1	1		1	1	1	1
27.1.2016	Ministry of agriculture	SI	Ariana Libertin	1	1		1										
26.11.2015	Biotechnical Faculty, department for Landscape architecture	SI	prof.dr. Mojca Golobič		1	1		1						1			1
14.10.2015	Karst Research Institute	SI	dr. Nataša Ravbar			1		1						1	1	1	
				6	15	13	6	6	4	2	3	2	0	8	6	7	12
	* the name in field "contact person" indicates the contact person from the organisation and not the name of interviewee. On several occasions, this was the same person	** in English translation															

Annex II: NKS questionnaire template

See Chapter 1, Annex I for English version

Annex III: NKS hand-out: INSPIRATION interview at a glance

See Chapter 1, Annex II

Annex IV: Shorted version for the additional interviews in Slovenian language

Intervju ključnih nacionalnih deležnikov (NKD) projekta INSPIRATION

Namen projekta INSPIRATION:

Glavni namen projekta INSPIRATION, ki ga finančno podpira Evropska komisija, je oblikovati strateške razvojne agende/ programe (SRA) za končne uporabnike na področju rabe zemljišč, sprememb rabe zemljišč ter za vplivne dele sistema prst - sedimenti - voda, kot pomoč pri uspešnemu soočanju z izzivi in potrebami družbe.

Ključni nacionalni deležniki (KND)

Ključni nacionalni deležniki so strateško pomembne institucije oziroma vodilne osebe z jasno vizijo in dobrim vpogledom v priložnosti s poudarkom na potrebe po novih znanjih (na kratki, srednji in dolgi rok) s svojega področja, z izkušnjami pri povezovanju znanosti in ukrepov/ prakse in z vpogledom v nacionalne in mednarodne finančne sheme za področje raziskav.

Postopek zbiranja podatkov

Zbiranje podatkov je ključnega pomena tako za projekt INSPIRATION v celoti, kot tudi za Slovenijo. Na osnovi zbranih podatkov se bodo pripravile nacionalne strateške razvojne agende, kakor tudi za vsako državo posebej. Osnutek nacionalne strateške razvojne agende bo predstavljen na nacionalni delavnici, kjer se bodo dodatno zbirale pripombe in predlogi ter poskušalo izpostaviti prioritetna področja raziskav v Sloveniji. Na podlagi pripomb in predlogov se bo izdelala nacionalna strateška agenda Slovenije, ki bo predstavljala tudi vhodni podatek za skupne evropsko raziskovalno agendo.

Prednosti in priložnosti vašega sodelovanja:

1. Priložnost sodelovanja pri **priprave Strateške raziskovalne agende Slovenije** oziroma sodelovanje pri zbiranju raziskovalnih potreb.
2. **Priložnost vplivanja na evropsko Strateško raziskovalno agendo** v luči družbenih izzivov in potreb.
3. **Možnost uporabe rezulatov projekta** med katerimi je pregled raziskovalnih potreb obstoječih in predvidenih shem financiranja na različnih nivojih (regionalnih, nacionalnih, evropskih, mednarodnih) in izkoristiti priložnost za boljše povezovanje med znanostjo in politiko ter prakso.
4. **Povezava z drugimi mrežami znotraj in izven Slovenije,** v katerih se lahko bodisi z izmenjavo znanj soočimo z družbenimi izzivi, bodisi s skupnim pristopom rešujemo skupne probleme.

Hvala za sodelovanje!

VPRAŠALNIK

A. Osnovne informacije o intervjuju

B. Osnovni podatki o osebi/organizaciji, ki izpolnjuje vprašalnik

1. Ime osebe, ki izpolnjuje(jo) vprašalnik (svoje ime in priimek vpišite, če želite):

_____

Organizacija: _____

Datum intervjuja: _____

Prosimo označite, kako izpolnjujete vprašalnik:

☐ *Anonimno*

☐ ***Osebno mnenje***

☐ *Mnenje organizacije*

2. Kako bi najboljše klasificirali vašo organizacijo? (več možnih odgovorov):

☐ *Ministrstvo, občina*

☐ *Univerza, raziskovalni inštitut*

☐ *Malo oziroma srednjeveliko podjetje (SME, < 500 zaposlenih) / konzultant*

☐ *Veliko podjetje, industrija*

☐ *Nevladna organizacija (NGO)*

☐ *Mreža, zveza organizacij*

☐ *Drugo:* _____

3. Vaše strokovno področje (več možnih odgovorov):

☐ *Prst/zemljine*

☐ *Vode*

☐ *Sedimenti*

☐ *Prostorsko/urbanistično načrtovanje*

☐ *Upravljanje s prostorom*

☐ *Drugo:* _____

4. Ali vaša organizacija financira raziskovalne naloge?

☐ *Da (prosimo obrazložite na kakšen način)*

Financiranje raziskovalnih nalog za lastne potrebe

_____

☐ *Ne*

C. Raziskovalna vprašanja / potrebe

Glede na vaše izkušnje/vedenje, katere **raziskovalne teme** bi morali vključiti v Strateško raziskovalno agendo Slovenije?

NASLOV teme št.1: _____

Koga najbolj zadeva predlagana tema?

_____

Kdo je odgovoren za temo/področje?

_____

_____

Ali tema zadeva vašo organizacijo / oddelek?

_____

_____

Ali tema zadeva samo Slovenijo ali tudi širše v EU/ svetu?

_____

Kje smo danes na tem področju in kje bi želeli biti čez x let?

_____

Kje in kako bi bilo novo znanje najboljše uporabljeno?

_____

Pomembnost predlagane teme za družbo:

☐ *izjemno pomembna*

☐ *zelo pomembna*

☐ *srednje pomembna*

☐ *manj pomembna*

☐ *nepomembna*

Kaj je urgentno, kaj gre lahko narobe, če ne bomo storili ničesar na tem področju?

Naloga države in lokalnih skupnosti je zagotoviti enakomeren in enakopraven dostop do storitev

_____

Kdo bi po vašem mnenju moral ali morda želel financirati predlagano temo?

_____

Kateri so pomembni oziroma relevantni dokumenti, raziskave, raziskovalni programi, ki podpirajo to temo. (state-of-the-art)?

_____

C. Raziskovalna vprašanja / potrebe

Glede na vaše izkušnje/vedenje, katere **raziskovalne teme** bi morali vključiti v Strateško raziskovalno agendo Slovenije?

NASLOV teme št.2: _____

Koga najbolj zadeva predlagana tema?

_____

Kdo je odgovoren za temo/področje?

_____

Ali tema zadeva vašo organizacijo / oddelek?

_____

Ali tema zadeva samo Slovenijo ali tudi širše v EU/ svetu?

_____

_____

Kje smo danes na tem področju in kje bi želeli biti čez x let?

_____

Kje in kako bi bilo novo znanje najboljše uporabljeno?

_____

Pomembnost predlagane teme za družbo:

☐ *izjemno pomembna*

☐ *zelo pomembna*

☐ *srednje pomembna*

☐ *manj pomembna*

☐ *nepomembna*

Kaj je urgentno, kaj gre lahko narobe, če ne bomo storili ničesar na tem področju?

_____

_____

Kdo bi po vašem mnenju moral ali morda želel financirati predlagano temo?

_____

Kateri so pomembni oziroma relevantni dokumenti, raziskave, raziskovalni programi, ki podpirajo to temo. (state-of-the-art)?

_____

_____

C. Raziskovalna vprašanja / potrebe

Glede na vaše izkušnje/vedenje, katere **raziskovalne teme** bi morali vključiti v Strateško raziskovalno agendo Slovenije?

NASLOV teme št.3: _____

Koga najbolj zadeva predlagana tema?

Kdo je odgovoren za temo/področje?

Ali tema zadeva vašo organizacijo / oddelek?

Ali tema zadeva samo Slovenijo ali tudi širše v EU/ svetu?

Kje smo danes na tem področju in kje bi želeli biti čez x let?

Kje in kako bi bilo novo znanje najboljše uporabljeno?

Pomembnost predlagane teme za družbo:

☐ *izjemno pomembna*

☐ *zelo pomembna*

☐ *srednje pomembna*

☐ *manj pomembna*

☐ *nepomembna*

Kaj je urgentno, kaj gre lahko narobe, če ne bomo storili ničesar na tem področju?

Kdo bi po vašem mnenju moral ali morda želel financirati predlagano temo?

Kateri so pomembni oziroma relevantni dokumenti, raziskave, raziskovalni programi, ki podpirajo to temo. (state-of-the-art)?

Po potrebi dodajte še dodatne teme.

Annex V:Localised version of interview introduction in Slovenian language

Namen intervjujev ključnih nacionalnih deležnikov (NKD) projekta INSPIRATION

Namen projekta INSPIRATION:

Glavni namen projekta INSPIRATION, ki ga finančno podpira Evropska komisija, je oblikovati strateške razvojne agende/ programe (SRA) za končne uporabnike na področju rabe zemljišč, sprememb rabe zemljišč ter za vplivne dele sistema prst - sedimenti - voda, ki bi bili v pomoč pri uspešnemu soočanju se z izzivi in potrebami družbe. Poleg strateške razvojne agende (SRA) je cilj projekta tudi oblikovati metodologijo za njeno uspešno izvajanje ter vzpostaviti mrežo javnih in zasebnih ustanov, ki bi finančno podprle izvedbo SRA.

Ključni nacionalni deležniki (KND)

V nizu intervjujev s ključnimi nacionalnimi deležniki (KND), ki se bodo izvajali širom Evrope, bodo nacionalne kontaktne točke (NKT) v svojih državah zbirale podatke o raziskovalnih potrebah s področja projekta INSPIRATION, in sicer za področje upravljanja z zemljišči in sistemi, ki povezujejo tipe tal(prst), sedimente in vodo, o:

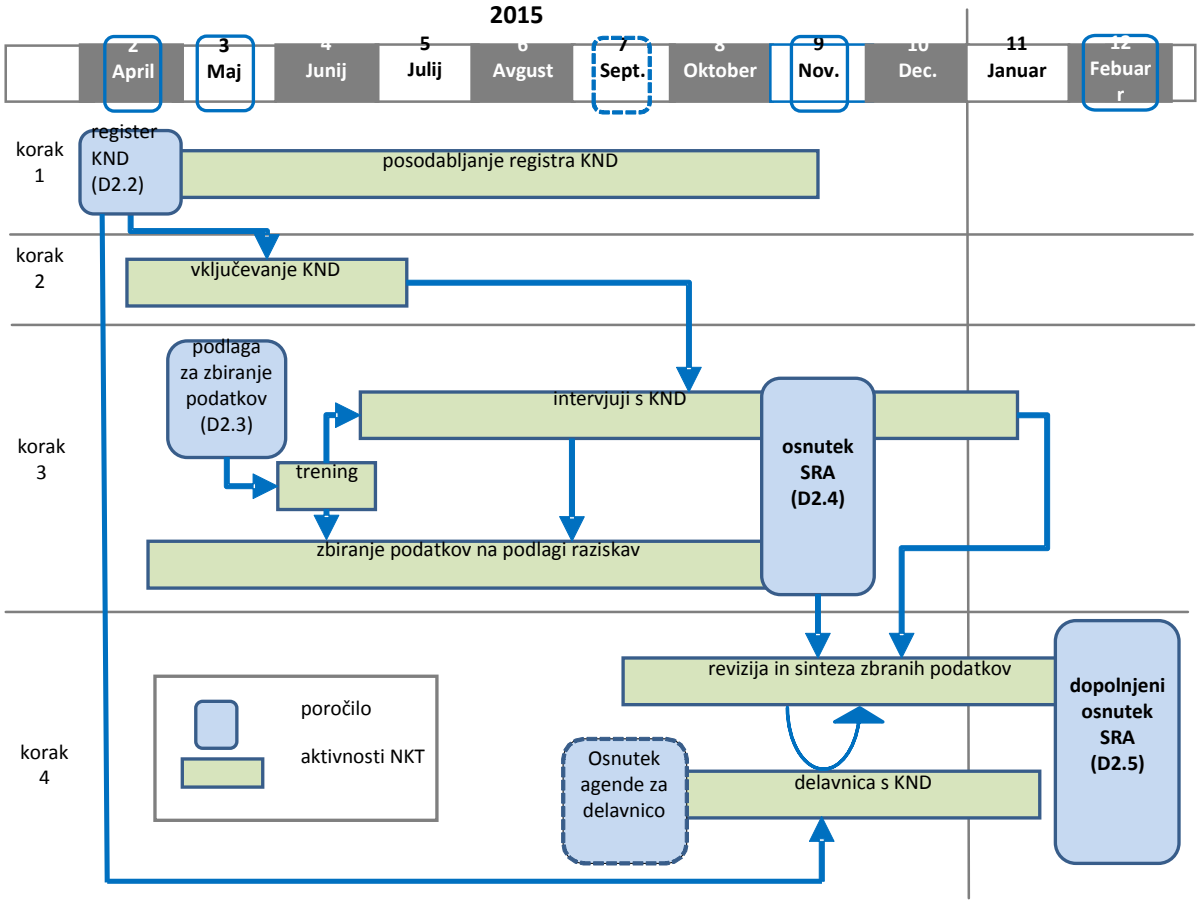
- potrebah s področja raziskav in inovacij,
- izkušnjah pri povezovanju znanosti in ukrepov/ prakse,
- nacionalnih in mednarodnih finančnih shemah za področje raziskav.

V intervjujih se bodo nacionalne kontaktne točke (NKS) osredotočale na strateško pomembne institucije oziroma vodilne osebe z jasno vizijo in dobrim vpogledom v priložnosti s poudarkom na potrebe po novih znanjih (na kratki, srednji in dolgi rok) s svojega področja. Izbrani KND zastopajo različna strokovna/ znanstvena področja in vključujejo tako prostorske načrtovalce kot managerje, strokovnjake za prst, sedimente, vode in druge. Ti lahko delujejo v okviru raziskovalnih organizacij, kot finančne institucije ali kot načrtovalci ukrepov. KND so običajno vključeni v pomembna strokovna združenja in mreže, kjer lahko postanejo ambasadorji projekta INSPIRATION.

Postopek zbiranja podatkov

Zbiranje podatkov s pomočjo KND, strokovnjakov z različnih področij, je ključnega pomena tako za Slovenijo kot projekt INSPIRATION v celoti. Na ta način se bomo seznanili s stanjem s področja upravljanja z zemljišči in sistemi, ki povezujejo tipe tal(prst), sedimente in vodo v Sloveniji, zbrani podatki pa bodo služili kot podlaga za oblikovanje evropske raziskovalne agende. Na podlagi najmanj 20 intervjujev in preliminarno analizo stanja tako razpisov kot finančnih virov, se bodo pripravila nacionalna poročila kot nacionalne strateške razvojne agende za vsako državo posebej. Osnutek nacionalne strateške razvojne agende bo predstavljen na nacionalni delavnici, kjer se bodo dodatno zbirale pripombe in predlogi ter poskušalo izpostaviti prioritetna področja raziskav v Sloveniji. Na podlagi pripomb in predlogov se bo izdelala nacionalna strateška agenda Slovenije, ki bo predstavljala podlago za izdelavo skupne evropske raziskovalne agende.

Grafični prikaz poteka projekta INSPIRATION v časovnem obdobju enega leta



Primeri vprašanj izpostavljenih na intervjujih z različnih področij:

Potrebe s področja raziskav in inovacij

- Kateri družbeni izzivi so za vas pomembni?
- Glede na vaše izkušnje: katere tematike / področja (z vidika raziskav) bi bilo potrebno vključiti v SRA?

Izkušnje pri povezovanju znanosti s prakso

- Kako bi definirali znanstvena spoznanja (angl. ‘scientific knowledge’)?
- V kolikšni meri so se na podlagi analiz obstoječega stanja znanstvenih raziskav v Sloveniji oblikovale obstoječe politike?

Nacionalne in mednarodne finančne sheme s področja raziskav

- Ali vaša organizacija zagotovlja finančne vire zunanjih raziskav?
- Kakšne izkušnje in pričakovanja glede finančnih shem (javnih / zasebnih), ki predstavljajo priložnosti za nadaljne raziskave s področja rabe zemljišč in upravljanja ter vplivov na dele sistema prst - sedimenti – voda, imate s svojega področja?

Prednosti vašega sodelovanja:

- Priložnost vplivanja na evropsko SRA na področju upravljanja z zemljišči in vplivnimi deli sistema prst - sedimenti – voda v luči družbenih izzivov in potreb
- Možnost uporabe rezulatov projekta med katerimi je pregled raziskovalnih potreb obstoječih in predvidenih shem financiranja na različnih nivojih (regionalnih, nacionalnih, evropskih, mednarodnih) in izkoristiti priložnost za boljše povezovanje med znanostjo in politiko ter prakso.
- Povezati se z drugimi mrežami znotraj in izven Slovenije, kjer se lahko bodisi z izmenjavo znanj iz drugih držav soočimo z družbenimi izzivi, bodisi s skupnim pristopom reševati skupne problem.

Kontaktni podatki:

Informacije o projektu INSPIRATION so dostopne na spletni strani:

Kontaktni podatki nacionalne kontaktne točke:

Boštjan Cotič

Urbanistični inštitut Republike Slovenije
Urban Planning Institute of the Republic of Slovenia
Trnovski pristan 2
p.p. 4717
SI-1127 Ljubljana
Slovenija
t: +386 (0)1 420 1300
f: +386 (0)1 420 1330
http://www.uirs.si

Tel: +386 1 420 12 25
E-mail: bostjan.cotic@uirs.si

Kontaktni podatki koordinatorja projekta:

Stephan Bartke
FG I3.5 – Coordination INSPIRATION

Federal Environment Agency
Woerlitzer Platz 1
06844 Dessau-Rosslau
Germany

stephan.bartke@uba.de

Annex VI: Documents used for the SI desk study

Strategija pametne specializacije (2015) Službe vlade Republike Slovenije za razvoj in evropsko kohezijsko politico

Gajšek M., Stanič I., Grilc U., Premlč M., (2015), Trajnostna urbana strategija Mestne občine Ljubljana, Mestna občina Ljubljana,

Resolucija o raziskovalni in inovacijski strategiji Slovenije 2011–2020 (ReRIS11-20), (2011), Uradni list RS, št. 43/2011

Zakon o raziskovalni in razvojni dejavnosti, Uradni list RS, št. 96/02 z dopolnitvami: Zakon o spremembi Zakona o raziskovalni in razvojni dejavnosti -ZRRD-A (Uradni list RS, št. 115/05, Zakon o spremembah in dopolnitvah Zakona o raziskovalni in razvojni dejavnosti - ZRRD-B (Uradni list RS, št. 112/07, Zakon o spremembah in dopolnitvah Zakona o raziskovalni in razvojni dejavnosti – ZRRD-C Uradni list RS, št. 9/11, Zakon o spremembah in dopolnitvah Zakona o podpornem okolju za podjetništvo -ZPOP-1A (Uradni list RS, št. 57/2012

Načrt razvoja raziskovalnih infrastruktur 2011–2020, (2011), Vlada Republike Slovenije http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Znanost/pdf/Zakonodaja/NRRI.pdf

Uredba o normativih in standardih za določanje sredstev za izvajanje raziskovalne dejavnosti, financirane iz Proračuna Republike Slovenije (Uradni list RS, št. 103/11, 56/12 in 15/14)

Annex VII: Invitation with Agenda for the National event

Nacionalni posvet ključnih deležnikov:

Strateška raziskovalna agenda Slovenije

za področja rabe zemljišč, spremembe rabe zemljišč ter za vplivne dele sistema prst - sedimenti - voda

posvet bo potekal **10. decembra 2015 v Mestnem muzeju Ljubljana**, Gosposka 15, 1000 Ljubljana v konferenčni dvorani (vhod iz atrija).

8.30-9.00 ***Registracija udeležencev***

9:00-9.20 ***Uvodni pozdrav***

doc.dr. Breda Mihelič, direktorica UIRS

mag. Barbara Radovan
direktorica Direktorata za prostor, graditev in stanovanja, Ministrstvo za okolje in prostor

9.20- 10.00 ***1. del: predstavitev projekta, vprašalnika in rezultatov***

9.20- 9.30 Boštjan Cotič, UIRS
Namen projekta INSPIRATION in namen posveta

9.30- 9.40 Barbara Mušič, UIRS
Predstavitev vprašalnika
(predavanje bo v angleškem jeziku)

9.40- 10.30 dr. Matej Nikšič, UIRS
Povzetek odgovorov iz vprašalnikov in osnutek SRA za Slovenijo
(predavanje bo v angleškem jeziku)

10.30- 11.00 ***Odmor za kavo***

11.00- 13.00 ***2. del: Razprava o raziskovalnih temah***

13.00- 14.00 ***Kosilo*** *(v atriju Mestnega muzeja))*

14.00- 15.30 ***3. del: povzetki razprave in dopolnitev SRA za Slovenijo***

15.30 ***Zaključek posveta***

Namen projekta INSPIRATION
Glavni namen evropskega projekta INSPIRATION je oblikovati strateško raziskovalno agendo/ program (SRA) za področje rabe zemljišč, spremembe rabe zemljišč ter za vplivne dele sistema prst - sedimenti - voda, ki bi bili v pomoč pri uspešnemu soočanju z izzivi in potrebami sodobne družbe. Poleg tega je cilj projekta oblikovati metodologijo za uspešno izvajanje SRA in vzpostaviti mrežo javnih in zasebnih ustanov, ki bi finančno podprle izvedbo SRA.

Ključni nacionalni deležniki (KND)
V nizu intervjujev s ključnimi nacionalnimi deležniki (KND), ki se bodo izvajali širom Evrope, bodo nacionalne kontaktne točke (NKT) v svojih državah zbirale podatke o raziskovalnih potrebah s področja projekta INSPIRATION, in sicer za področje upravljanja z zemljišči in sistemi, ki povezujejo tipe tal(prst), sedimente in vodo, o:
potrebah na področju raziskav in inovacij,
izkušnjah pri povezovanju znanosti in ukrepov/ prakse,
nacionalnih in mednarodnih finančnih shemah za področje raziskav.
V intervjujih se bodo nacionalne kontaktne točke (NKS) osredotočale na strateško pomembne institucije oziroma vodilne osebe z jasno vizijo in dobrim vpogledom v priložnosti s poudarkom na potrebe po novih znanjih (na kratki, srednji in dolgi rok) s svojega področja. Izbrani KND zastopajo različna strokovna/ znanstvena področja in vključujejo tako prostorske načrtovalce kot managerje, strokovnjake za prst, sedimente, vode in druge. Ti lahko delujejo v okviru raziskovalnih organizacij, kot finančne institucije ali kot načrtovalci ukrepov. KND so običajno vključeni v pomembna strokovna združenja in mreže, kjer lahko postanejo ambasadorji projekta INSPIRATION.

Postopek zbiranja podatkov
Zbiranje podatkov s pomočjo KND, strokovnjakov z različnih področij, je ključnega pomena tako za Slovenijo kot projekt INSPIRATION v celoti. Na ta način se bomo seznanili s stanjem s področja upravljanja z zemljišči in sistemi, ki povezujejo tipe tal(prst), sedimente in vodo v Sloveniji, zbrani podatki pa bodo služili kot podlaga za oblikovanje evropske raziskovalne agende. Na podlagi najmanj 20 intervjujev in preliminarno analizo stanja tako razpisov kot finančnih virov, se bodo pripravila nacionalna poročila kot nacionalne strateške razvojne agende za vsako državo posebej. Osnutek nacionalne strateške razvojne agende bo predstavljen na nacionalni delavnici, kjer se bodo dodatno zbirale pripombe in predlogi ter poskušalo izpostaviti prioritetna področja raziskav v Sloveniji. Na podlagi pripomb in predlogov se bo izdelala nacionalna strateška agenda Slovenije, ki bo predstavljala podlago za izdelavo skupne evropske raziskovalne agende.

Kontaknti podatki
Za dodatne informacije, prosimo kontaktiranje nacionalno kontaktno točko (NKT)

Boštjan Cotič
Urbanistični inštitut Republike Slovenije
bostjan.cotic@uirs.si (01) 420 13 21
http://www.inspiration-h2020.eu/
http://inspiration.uirs.si/

Annex VIII. Presentation: report of results from D 2.4. for National event

Nacionalni posvet ključnih deležnikov:
Strateška raziskovalna agenda Slovenije
za področja rabe zemljišč, spremembe rabe zemljišč ter za vplivne dele sistema prst - sedimenti - voda

Povzetek odgovorov iz vprašalnikov in osnutek SRA za Slovenijo

Ina Šuklje Erjavec,
Urbanistični inštitut Republike Slovenije
Ljubljana, 10.december 2015

INSPIRATION
INTEGRATED SPATIAL PLANNING, LAND USE AND SOIL MANAGEMENT RESEARCH ACTION

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642372

INSPIRATION
INTEGRATED SPATIAL PLANNING, LAND USE AND SOIL MANAGEMENT RESEARCH ACTION

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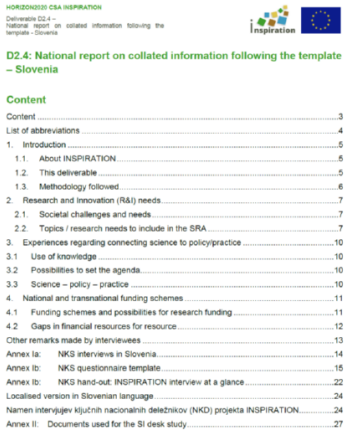
OD VPRAŠALNIKOV DO OSNUTKA STRATEŠKE RAZISKOVALNE AGENDE

- Skupen okvir za NACIONALNO POROČILO za vse partnerje

- 4 delni:
  1. Uvod – o projektu INSPIRATION
  2. POTREBE PO RAZISKAVAH IN INOVACIJAH
  3. IZKUŠNJE GLEDE POVEZOVANJA ZNANOSTI IN POLITIK/PRAKSE
  4. NACIONALNE IN MEDNARODNE FINANČNE SHEME

- Primerjava in povezava predlogov z različnih držav
- Predlogi raziskovalnih tem za prihodnje razpise H2020
- Nabor informacij - povezovanje za skupne prijave

- Osnova za pripravo izhodišč za SRA v Sloveniji



HORIZON2020 CSA INSPIRATION

Deliverable D2.4 – National report on collated information following the template - Slovenia

D2.4: National report on collated information following the template – Slovenia

Content

2

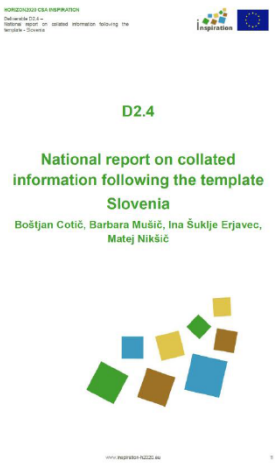
Nacionalni posvet ključnih deležnikov, Ljubljana 10.12.2015

INSPIRATION
INTEGRATED SPATIAL PLANNING, LAND USE AND SOIL MANAGEMENT RESEARCH ACTION

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642372

NACIONALNO POROČILO

- Oddan delovni osnutek z do 30. novembra zbranimi odgovori - D2.4
- Nadaljevanje zbiranja odgovorov do srede januarja 2016
- Nacionalno poročilo D2.5 do konca januarja 2016
- usklajevanje vsebin z nacionalnimi deležniki



osnova za pripravo izhodišč za
Strateško Raziskovalno Agendo za Slovenijo

3

Nacionalni posvet ključnih deležnikov, Ljubljana 10.12.2015

INSPIRATION
INTEGRATED SPATIAL PLANNING, LAND USE AND SOIL MANAGEMENT RESEARCH ACTION

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642372

Pregled dosedanjih odgovorov na vprašalnike – ključni nacionalni deležniki

- 15 razdeljenih vprašalnikov in sestankov
- 12 izpolnjenih
- Ostali v delu / dogovorih

	NACIONALNI DELEŽNIKI	Tip deležnika	Možnost financiranja raziskav
1	UL, BF, Oddelek za krajinsko arhitekturo	fakulteta	
2	UL, BF, Oddelek za agronomijo	fakulteta	
3	Fakulteta za arhitekturo, Univerza v Ljubljani	fakulteta	
4	Inštitut za raziskovanje krasa, ZRC-SAZU	javni inštitut	
5	Inštitut za vode Republike Slovenije	javni inštitut	
6	Urbanistični inštitut Republike Slovenije – v delu	javni inštitut	
7	Inštitut za politike prostora	Inštitut / NGO	
8	Zbornica za arhitekturo in prostor Slovenije	Strokovna zbornica	
9	DUPPS	Strokovno združenje	
10	CGS plus d.o.o.	SME	
11	Lasscan d.o.o	SME	
12	Mestna občina Ljubljana	OBČINA	
13	Mestna občina Kranj	OBČINA	
14	Ministrstvo za okolje in prostor, Direktorat za prostor, graditev in stanovanja – v delu	ministrstvo	
15	Ministrstvo za kmetijstvo, gozdarstvo in prehrano - v pripravi	ministrstvo	
16	????		
17	????		
18	????		
19			
20	ARRS	državna agencija	

Priprava preglednih tabel
delovna gradiva
Združevanje odgovorov po tipih
V skladu s strukturo nacionalnih poročil

4

Nacionalni posvet ključnih deležnikov, Ljubljana 10.12.2015

INSPIRATION
INTEGRATED SPATIAL PLANNING, LAND USE AND SOIL MANAGEMENT RESEARCH ACTION

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642372

Pregled dosedanjih odgovorov na vprašalnike – skupne pregledne tabele

združevanje odgovorov po tipih
v skladu s strukturo nacionalnih poročil

1. POTREBE PO RAZISKAVAH IN INOVACIJAH
2. IZKUŠNJE GLEDE POVEZOVANJA ZNANOSTI IN POLITIK / PRAKSE
3. NACIONALNE IN MEDNARODNE FINANČNE SHEME
4. OSNOVNE INFORMACIJE O INTERVJUVANCU – samo delno v poročila
5. POVRATNE INFORMACIJE in POMEMBNE PRIPOMBE – samo delno v poročila

INSPIRATION
INTEGRATED SPATIAL PLANNING, LAND USE AND SOIL MANAGEMENT RESEARCH ACTION

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642372

Pregled dosedanjih odgovorov na vprašalnike – skupne pregledne tabele

POTREBE PO RAZISKAVAH IN INOVACIJAH (R&I NEEDS)			
	NACIONALNI DELEŽNIK	DRUŽBENI IZZIVI IN POTREBE Sinteza odgovorov na vprašanje 7	TEMATIKE /RAZISKOVALNE POTREBE ZA VKLJUČITEV V SRA Sinteza odgovorov na vprašanja 8-9
1			

IZKUŠNJE GLEDE POVEZOVANJA ZNANOSTI IN POLITIK/PRAKSE					
	NACIONALNI DELEŽNIK	UPORABA ZNANJA Sinteza odgovorov na vprašanja 11-12-13 in 16	MOŽNOSTI ZA OBLIKOVANJE AGENDE Sinteza odgovorov na vprašanja 14-15	ZNANOST - POLITIKE – PRAKSA Sinteza odgovorov na vprašanja 17-18-19	DEFINICIJA ZNANSTVENEGA ZNANJA Vprašanje 10
1					

NACIONALNE IN MEDNARODNE FINANČNE SHEME			
	NACIONALNI DELEŽNIK	FINANČNE SHEME IN MOŽNOSTI ZA FINANCIRANJE RAZISKOVANJA Sinteza odgovorov na vprašanja 20-21-24	VRZELI FINANČNIH VIROV ZA raziskovanje, kaj vse kje spregledano Sinteza odgovorov na vprašanja 22-23
1			

Toda

Prenos združenih informacij v NACIONALNO POROČILO

brez neposredne navedbe nacionalnih deležnikov

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1. POTREBE PO RAZISKAVAH IN INOVACIJAH

POTREBE PO RAZISKAVAH IN INOVACIJAH (R&I NEEDS)			
	NACIONALNI DELEŽNIK	DRUŽBENI IZZIVI IN POTREBE Sinteza odgovorov na vprašanje 7	TEMATIKE /RAZISKOVALNE POTREBE ZA VKLJUČITEV V SRA Sinteza odgovorov na vprašanja 8-9
1			

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Nacionalni posvet ključnih deležnikov, Ljubljana 10.12.2015

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DRUŽBENI IZZIVI IN POTREBE

pregled odgovorov na vprašanje 7

Which societal challenges do you regard as important?

- Contribute to food security and food safety;
- Ensure secure supplies of safe drinking water;
- Secure energy supply and distribution;
- Reduce raw material and resource consumption, Ensure efficient use of natural resources;
- Contribute to climate change mitigation and societal adaptation;
- Contribute to a healthy living environment;
- Ensure secure infrastructure

a. If applicable, what additional, other or alternative challenges would you suggest/prefer?

družbeni izzivi in potrebe s seznama	Izbor s strani NKD														
Prispevanje k blaženju klimatskih sprememb in družbenem prilagajanju	X	X	X	X	X	X		X	X	X	X		X	X	X
Prispevanje k zdravemu bivalnemu okolju		X	X		X	X		X	X	X		X		X	X
Zmanjševanje rabe surovin in virov in zagotavljanje učinkovite rabe naravnih virov					X					X	X	X			X
Prispevanje k prehrambni preskrbi in varnosti								X	X		X				X
Zagotavljanje varne preskrbe s pitno vodo	X			X			X								X
Zagotavljanje varne infrastrukture	X		I			X									X
Zagotavljanje energetske preskrbe in distribucije			I	X											X

Komentarji k seznamu:

- VSI SO POMEMBNI!
- PREŠIROKO ZASTAVLJENI ZA IZBIRANJE!

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DRUŽBENI IZZIVI IN POTREBE - DODATNI PREDLOGI

- Dobro stanje voda (izhaja iz Vodne direktive EU)
- Zmanjševanje poplavne ogroženosti (izhaja iz Poplavne direktive)
- Upravljanje – družbeni vidiki so pogosto podcenjeni v smislu potrebnih družbenih sprememb za dejanske spremembe
- Reguliranje in usmerjanje razvoja
- Varovanje ekosistemskih storitev
- Urbana prenova, regeneracija, rehabilitacija
- Koncepti za prepoznavo in vrednotenje relevantnih vplivov
- Priložnosti za inovativne tehnologije rabe tal
- Izboljševanje vode in tal
- Terasaste krajine
  - trajnostno prostorsko načrtovanju
  - Integrirano načrtovanje
  - Ohranjanje kmetijske in kulturne krajine
  - analize tveganja naravnih nesreč in preprečevanje nevarnosti
  - Zaznavanje krajine in okolju prijazen turizma
  - politika upravljanja zemljišč in raba zemljišč
- Trajnostno kmetijstvo
- Zdravo okolje
- Revitalizacija /oživljanje nerazvitih in zapuščenih območij
- Omogočanje prehoda na zeleno gospodarstvo in družbo z eko - inovacijami
- Razvoj celostnih in trajnostnih sistemov za globalno opazovanje okolja in informacijski sistemi
- Kulturna dediščina
- Zdravje , demografske spremembe in dobro počutje
- Varstvo okolja, trajnostno upravljanje naravnih virov, vode, biotske raznovrstnosti in ekosistemov

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1. POTREBE PO RAZISKAVAH IN INOVACIJAH

RAZISKOVALNE TEMATIKE in RAZISKOVALNE POTREBE

vprašanja 8 in 9

Starting with your own experience: which <u>specific topics</u> (research needs) should be included in the SRA?

a. Explain – elaborate the topic
   - *Who will be affected?*
   - *Who is responsible?*
   - *Is it a topic of concern of your organisation / department*
   - *Is it only a national topic, or a shared topic by multiple countries?*
   - *Where are we now, where do we want to be in x years (point on the horizon)?*
   - *How can the newly gained knowledge be effectively used?*

b. Priority:
   - What is the urgency, i.e. what goes wrong if we do nothing?

c. Who wants to/should fund this kind of research?

- What are the important / relevant documents, research agendas, research programmes underpinning these topics? (state-of-the-art)

- Related to these agendas and programmes: what are timelines of programming and windows-of-opportunities to influence agendas / programmes?

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RAZISKOVALNE TEMATIKE in RAZISKOVALNE POTREBE

Sinteza odgovorov na vprašanja 8 in 9 skrajšan pregled I.

PRESKRBA S PITNO VODO
Vpliv je na vsa naselja na poplavnih ravninah, in na vse prebivalce. Odgovornost je na javnih službah, upravi in državi.
Nevarnosti: privatizacije vodnih virov, zmanjšanje standardov…
Znanje bi se lahko uporabilo za boljše razumevanje tokov podzemnih voda.

ZAGOTAVLJANJE VARNE PRESKRBE S PITNO VODO (S KRAŠKEG AVODONOSNIKA)
V Sloveniji je polovica prebivalcev pa tudi biote, odvisna od preskrbe z vodo s kraškega vodonosnika.
Nevarnosti: lahko ostanemo brez zadostne količine kakovostnih vodnih virov, pride lahko do uničenja habitatov (vključno z endemskimi vrstami),
Znanje o specifičnih značilnostih vodnih tokov krasa je/bo potrebno ustrezno upoštevati v načrtovanju ali zakonskemu varovanju.

KLIMATSKE SPREMEMBE – POPLAVE IN PLAZOVI
Zaradi povečanja količin padavin se povečuje poplavna nevarnost. Prizadeti so tako prebivalci kot podjetja.
Tematika je pomembna načrtovanja in upravljanja rabe tal. Znanja se bi lahko uporabili za oblikovanje politik rabe tal, zavarovalne pristojbine…

MEDSEBOJNA ODVISNOST PROCESOV POPLAVE / EROZIJA – proces medsebojne odvisnosti vodne erozije in zemeljskih plazov je premalo raziskan in razumljen.
Nevarnosti: več težav s poplavami in erozij v prihodnosti
Novo znanje se bo lahko uporabilo za pripravo razvojnih planov in politik upravljanja prostora za doseganje izboljšanja kakovosti in varnosti bivanja na vseh ravneh, od lokalnih do transnacionalnih.

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RAZISKOVALNE TEMATIKE in RAZISKOVALNE POTREBE

Sinteza odgovorov na vprašanja 8 in 9 skrajšan pregled II.

ODNOS MED TLEMI IN TALNO VODO (SOIL-WATER RELATIONSHIP) IN UPRAVLJANJE S SISTEMOM TAL IN TALNE VODE– učinkovita raba vode kot naravnega vira pri pridelavi hrane – prispeva k prehranski varnosti. Pomen talne vode in interakcija med tlemi in talno vodo/ agronomski vidik vode je v raziskavah zapostavljen;
Nevarnosti: če se pravilno ne upravlja s talno vodo pride do suše, onesnaženja.

UPORABA VODE IZ ČISTILNIH NAPRAV ZA NAMAKANJE KMET. ZEMLJIŠČ; V Sloveniji pomanjkanje raziskav tega področja, s stališča varnosti vode in stališča potrošnikov/uporabnikov; slaba zakonodaja.
Več vode bi prečistili in uporabili s tega vira, manjši bi bil pritisk na voden vire.

POVEZAVA BIOTSKIH IN ABIOTSKIH DEJAVNIKOV – zelo veliko negotovosti in malo dejanskega poznavanja glede načina medsebojnega povezovanja biotskih in abiotskih dejavnikov kot tudi s tem povezanimi odzivanji specifičnih ekosistemov na določene vplive
Pridobljeno znanje služilo za ustreznejše poseganje v prostor in bolj trajnostno načrtovanje.

PRISPEVANJE K BLAŽENJU KLIMATSKIH SPREMEMB IN DRUŽBENEM PRILAGAJANJU
Vpliv je direktno na uporabnike prostora. Izpostavljenih je več mehanizmov in interdisciplinarnega vedenja, vendar spet ni direktne povezave s prakso
Nevarnosti: nevzdržni pogoji v prostoru / pregrevanje, poplave, mraz,… nezmožnost uporabe zunanjega prostora, negative vpliv degradiranih območij, izoliranost v prostoru,…
Novo znanje se bi lahko učinkovito uporabilo v urbani/ruralni prenovi, skratka prenovi grajenega prostora. boljšim in sistemskem odločanju kam in kje naselja širimo.

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RAZISKOVALNE TEMATIKE in RAZISKOVALNE POTREBE

Sinteza odgovorov na vprašanja 8 in 9

skrajšan pregled III.

PRISPEVANJE K ZDRAVEMU BIVALNEMU/ŽIVLJENSKEMU OKOLJU Raziskav o odnosu zdravja in prostora je malo. Nekatere vsebine se že izvajajo, niso pa vezane na prostorske podatke, kar bi bilo ključno
Nevarnosti: nekontrolirana gradnja, z vidika vpliva na psihofizične sposobnosti. Financiranje se pričakuje od WHO, ministrstva za zdravje, ministrstva za prostor, H2020 na nivoju RIA in povezav z gospodarstvom.
Tovrstno znanje ima direkten vpliv na definiranje kazalnikov urejanja prostora, raziskave, ki definiranje vpliv materialov na prostor (sevanje materialov, znotraj objekta in širši prostor).

PRISPEVANJE K PREHRAMBENI PRESKRBI IN VARNOSTI
Pomanjkanje sistematičnega prostorskega pristopa pri integriranem kmetijstvu, ekološki proizvodnji in poudarjanju lokalnih proizvodov. Manjka prenos iz teorije v prakso.
Nevarnosti: izguba naravne, lokalne hrane, neracionalnost uporabe hrane.
Novo pridobljeno znanje bi se lahko uporabilo v sistemskem prostorskem planiranju z vidika vključevanja vseh trajnostnih parametrov kot so mobilnost, lokalnost, pozidava zemljišč, prenova urbanega,.... kot tudi sodobna socialno-družbena organizacija urbano-ruralnega prostora, pomembna je tudi povezava z rabo tal, zemljiškim upravljanjem.

VPRAŠANJA ENERGIJE
Vpliva na vse porabnike, odgovornost pa nosijo država, mesto, javna podjetja, energetsko podjetništvo.
Novo znanje bi se lahko uporabilo za metodologije in tehnike vključevanja razpršenih proizvajalcev energije v mrežo – smart grid; intenzivnejše uvajanje OVE - zvrsti, cenovne politike

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RAZISKOVALNE TEMATIKE in RAZISKOVALNE POTREBE

Sinteza odgovorov na vprašanja 8 in 9

skrajšan pregled IV.

METODE UČINKOVITEGA OZAVEŠČANJA JAVNOSTI O POMENU IN VIDIKIH VODA – trenutno, je kljub obsežnim problemom, družba le delno ozaveščena o pomenu, različnih vidikih voda ter glede relevantnosti strokovnega raziskovalnega znanja o povezavi med različnimi vzroki in posledicami na območjih pomembnejših vplivov voda.
Nevarnosti: zmanjševanje znanja in razumevanja v družbi in s tem tudi manjša javna in politična podpora in slabše razvojne odločitve.

POMEN IN RAZUMEVANJE BOTTOM UP POBUD PRI PROSTORSKEM NAČRTOVANJU IN UPRAVLJANJU PROSTORSKIH RAB
sodelovanje in vključevanje javnosti in pobud »od spodaj navzgor« je sicer zelo pogosto omenjana tema, a je njeno razumevanje zelo pomanjkljivo.
Potrebno je poglobiti in razširiti razumevanje: kdaj in zakaj do takih pobud prihaja, kaj in kje so sprožilci in kakšne so pravzaprav dolgoročne posledice takega pristopa, kako bo dolgoročno vplivalo na vlogo in delovanje javnih uprav in upravljanja na vseh ravneh, tudi gospodarstvo.
Nevarnosti: neobvladljivost pojava in neusklajenost ali odsotnost odzivov javnih institucij, sledi stihija in ad hoc projekti, entropija in zmanjševanje učinkovitosti, posredni stroški se povečujejo ali pa vse skupaj zamre.

JAVNO UPRAVLJANJE IN PROSTORSKA KOORDINACIJA POLITIK /prostorska koordinacija javnega upravljanja /politik
Veliko je že sicer bilo raziskav na temo javnega upravljanja in koordinacije politik, vendar ne na prostorski ravni! Zelo pomembno je izboljšati razumevanje in znanje kako to deluje, kako, zakaj in kdaj pride do uspešnih koordinacij na različnih ravneh, kdaj ne – kakšni so mehanizmi.

NIVO IN NAČIN POTREBNE REGULACIJE – za uspešno upravljanje s prostorom in usklajevanje rab zemljišč je eno ključnih vprašanj tudi vprašanje potrebne uporabe regulativnosti pristopov za doseganje želenih ciljev.
Nevarnosti: nadaljevanje in krepitev zmedenosti in nekonsistentnosti, povečevanje konfliktnost in neučinkovitosti.
Znanja bi se lahko uporabila za izboljšanje pristopov in razumevanja pomena regulacije iz različnih vidikov, tudi s sociooloških vidikov, ugotoviti in opredeliti, kdaj, zakaj, na kakšnem nivoju, v kolikšnem obsegu in na kakšen način je potrebno in smiselno uporabiti regulativne pristope v načrtovanju in upravljanju, kako zagotoviti ustrezen odziv deležnikov in učinkovito implementacijo.

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RAZISKOVALNE TEMATIKE in RAZISKOVALNE POTREBE

Sinteza odgovorov na vprašanja 8 in 9

skrajšan pregled V.

RAZDROBLJENOST IN NEIZMENJAVANJE PODATKOV V SLOVENIJI IN EVROPI - Izdelati je potrebno metodologijo izmenjave podatkov! Problem je, da vsak posebej gradi svoje podatkovne/ GIS baze in ne prihaja do izmenjav. Zelo težko je dostopati do podatkov ARSO, DARS in DRSC, nuklearka Obstaja kup merilnih sistemov, ki niso usklajeni, a so financirani z državnim denarjem.
Nevarnosti: manjša konkurenčnost Slovenije zaradi počasnejšega reševanja problemov in izdelave projektov, dragega vzdrževanja podatkov, vpliva lahko tudi na varnost ljudi.
Želeli bi imeti proaktivni pristop ter tudi zagotavljanje dodane vrednosti lastnikom podatkov, kot je to primer v ZDA.

NEUČINKOVITA JAVNA NAROČILA, METODA NAJNIŽJE CENE – je problem, ki zelo vpliva na Slovenijo in je bolj nacionalnega značaja, toda morda se s podobnimi problemi srečujejo tudi drugje. Stanje je že zelo problematično in ima zato njegovo reševanje visoko prioriteto, saj vpliva na kakovost raziskav, tudi v kontekstu monitoringa kjer se želi uvajati kvalitativne kriterije.
Nevarnosti: padec kakovosti, padec konkurenčnosti, dolgi postopki in velika poraba časa, dodatni stroški za popravljanje slabih izvedb. Tematiko naj bi financirala Slovenija, delno pa tudi EU.

METODOLOGIJA ZA NATANČNO IN POENOTENO EVIDENTIRANJE NEZAZIDANIH STAVBNIH ZEMLJIŠČ V RS, ki bo v pomoč vzpostavitve sodobne zemljiške politike v Republiki Sloveniji.
Znanje bi se lahko uporabilo za ustrezen zajem zemljiške davščine kot na občine, da bodo imele dober pregled in bodo lahko skupaj s prostorskimi načrtovalci trajnostno načrtovale rabe zemljišč. Na ta način se bodo tudi bistveno se bodo zmanjšale pobude po posegih na kmetijska in gozdna zemljišča.

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Nacionalni posvet ključnih deležnikov, Ljubljana 10.12.2015

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RAZISKOVALNE TEMATIKE in RAZISKOVALNE POTREBE

Sinteza odgovorov na vprašanja 8 in 9

skrajšan pregled VI.

RAZISKOVANJE TERASASTIH KRAJIN – terasaste krajine so bile ustvarjene v zelo različnih družbeno- ekonomskih kontekstih. Pomembno je razviti instrumente za njihovo prenovo in vključevanje sodobne načine življenja ter opredelitev vseh pomembnih vidikov integralnega prostorskega načrtovanja in ohranjanje kmetijske in kulturne krajine, omogočajo prehod na zeleno gospodarstvo in družbo s pomočjo ekoloških inovacij, oživljanje nerazvitih in zapuščenih območij....upravljanje zemljišč in politike rabe zemljišč.
Možnost uporabe znanja pri vključevanju fizičnih parametrov v uradne prostorske dokumente (npr. uporaba analiz naklona terena za preprečevanje nevarnosti plazov.

RAZVOJ ŽELEZNIŠKE INFRASTRUCTURE V RS – analiza in preveritev pomena evropskih koridorjev na relaciji čez Slovenijo in študije prometne intermodalnosti, primerne za Slovenijo in gradacije železniškega sistema s proučitvijo vključitve v slovenski prometni sistem. V prihodnosti bi v tem pogledu želeli biti na nivoju Japonske in porabiti pri načrtovanju sodobnega trajnostnega železniškega, dobro intermodalno povezanega v evropski in slovenski prometni sistem. Tema je nacionalnega značaja, ima visoko prioriteto in bo vplivala bo tako na RS in prebivalstvo RS, spodbuden vpliv na gospodarski razvoj..

UREJANJE JAVNIH PROSTOROV PRI CELOVITI PRENOVI VELIKIH STANOVANJSKIH SOSESK IZ 60-TIH DO 80-TIH LET 20.ST. Tema je nacionalnega značaja, ima visoko prioriteto in bo vplivala bo tako na lokalne skupnosti, prebivalci,. Za področje tematike je odgovorna država – ministrstvo za okolje in prostor ter za pravosodje, V prihodnosti bi v tem pogledu želeli biti na nivoju Velike Britanije in Avstrije.

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Nacionalni posvet ključnih deležnikov, Ljubljana 10.12.2015

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2. IZKUŠNJE GLEDE POVEZOVANJA ZNANOSTI IN POLITIK / PRAKSE

IZKUŠNJE GLEDE POVEZOVANJA ZNANOSTI IN POLITIK/PRAKSE					
	NACIONALNI DELEŽNIK	**UPORABA ZNANJA** Sinteza odgovorov na vprašanja 11-12-13 in 16	**MOŽNOSTI ZA OBLIKOVANJE AGENDE** Sinteza odgovorov na vprašanja 14-15	**ZNANOST - POLITIKE – PRAKSA** Sinteza odgovorov na vprašanja 17-18-19	**DEFINICIJA ZNANSTVENEGA ZNANJA** Vprašanje 10
1					

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UPORABA ZNANJA
Sinteza odgovorov na vprašanja 11-12-13 in 16

- Razlike med tipi deležnikov
- Izven znanstveno-raziskovalnih krogov se znanstvena spoznanja običajno poskuša implementirati in aplicirati v projekte za boljše rešitve, opredeljevanje ciljev, za izobraževanje, pripravo projektov
- Premalo uporabnega prenosa znanstveno raziskovalnih znanj v prakso
- Na splošno se uporablja večino razpoložljivih virov, še najmanj TV in časopise

Glede vključevanje obstoječega znanja v politike

- Različni odgovori glede na tip deležnika – mnogi niti nimajo vpogleda
- Večina odgovorov zelo kritičnih – omejen obseg vključevanja
- Kot primer dobre prakse se omenja SPRS, tudi Mreža za prostor

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MOŽNOSTI ZA OBLIKOVANJE AGENDE ter povezovanje ZNANOST - POLITIKE – PRAKSA

Sinteza odgovorov na vprašanja 14-15 ter 17-18-19

- Zelo velike razlike med tipi deležnikov
- Večina ne pozna dokumenta, ki bi v Sloveniji povezoval ZNANOST, POLITIKO IN PRAKSO.
- Nacionalne znanstveno raziskovalne politike in programi NE vključujejo posebnih raziskovalnih potreb in prioritet večine vprašanih deležnikov
- Številni nimajo možnosti vpliva na oblikovanje raziskovalnih programov in raziskovalnih vprašanj
- Nekaj več je sodelovanja pri povezovanju znanstvenih spoznanj za oblikovanje politik,
- kot primer je omenjen dokument Pametna specializacija Slovenije

Trenutni sistem razpisov s predlaganjem tem daje možnost vplivanja predvsem raziskovalcem

Prenos znanja v prakso je na tem področju šibek

INSPIRATION
INTEGRATED SPATIAL PLANNING, LAND USE AND SOIL MANAGEMENT RESEARCH ACTION

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642372

3. VPRAŠANJA FINANCIRANJA

NACIONALNE IN MEDNARODNE FINANČNE SHEME			
	NACIONALNI DELEŽNIK	FINANČNE SHEME IN MOŽNOSTI ZA FINANCIRANJE RAZISKOVANJA Sinteza odgovorov na vprašanja 20-21-24	VRZELI FINANČNIH VIROV ZA raziskovanje, kaj vse kje spregledano Sinteza odgovorov na vprašanja 22-23
1			

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FINANČNE SHEME IN MOŽNOSTI ZA FINANCIRANJE RAZISKOVANJA

Sinteza odgovorov na vprašanja 20-21-24

- Trenutno stanje financiranje je večinoma ocenjeno kot nevtralno do zelo slabo
- Odsotno financiranje raziskovanja na lokalni ravni
- Trenutno zelo šibko tudi na nacionalni ravni, še posebno raziskovanje prostorskih tematik
- Večina je trenutno odvisna od financiranja s strani različnih evropskih programov
- Poznavanje drugih mednarodnih virov financiranja je šibko

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Nacionalni posvet ključnih deležnikov, Ljubljana 10.12.2015

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Za ustvarjanje dodane vrednosti različnih finančnih virov

!!!!!

- občutno zmanjšati birokracijo, vključno z zahtevano podrobnostjo za prijave,
- zmanjšati zaostanek v povrnitvi stroškov - zalaganje denarja vnaprej je zelo problematično za manjše institucije
- zmanjšati administracijo in kontrolo in povečati zaupanje in odgovornost
- uporabiti je potrebno bolj ameriški pristop = manj administracije, rezultati na voljo vsem, večje zaupanje raziskovalcem
- Izogibati se kompliciranim in nejasnim razpisnim dokumentacijam
- spodbujanje čistega raziskovanja, brez sofinanciranja, vendar z vključenostjo gospodarstva
- izboljšati koordinacijo financerjev, ter denar združevati za večje in bolj relevantne projekte
- Sistemsko urediti financiranje multi-sektorskih projektov – kdo razpisuje teme in financira?
- Okrepiti financiranje velikih, celovitih, aplikativnih projektov, v katerih se udeleženci (ki bi si sicer konkurirali)i lahko povezujejo
- Okrepiti pristope od spodaj navzgor
- integrirati raziskovalce in njihove rezultate v oblikovanje politik, strategij in prostorsko načrtovanje
- uporaba raziskovalnih gradiv za nacionalne strategije in prenos v primere dobre prakse na občinskih nivojih.
- Prevajanje rezultatov raziskovalnih projektov v razumljiv, poljuden jezik, da bi se lahko uporabili za politike in dokumente
- bolj praktično usmerjeno raziskovanje s testiranjem v praksi, metodologije
- jasno pokazati je pomembno finančno korist, win-win situacije

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Nacionalni posvet ključnih deležnikov, Ljubljana 10.12.2015

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VRZELI FINANCIRANJA RAZISKOVANJA – SPREGLEDANE TEME

Sinteza odgovorov na vprašanja 22-23

- Zelo slabo se financira celotno območje raziskovanja prostorskih tematik
- Zelo slabo prepoznavanje prostora kot skupnega, povezovalnega okvira/medija za povezovanje vseh sektorjev, za uresničevanja ciljev razvoja, posegov in aktivnosti
- Vključiti vsebine prostorskega načrtovanja kot transdisciplinarne, ne pa kot interdisciplinarne
- nerazumevanje in nepoznavanje integralnih pristopov (prevladovanje sektorskih miselnih vzorcev
- Za boljše financiranje integralnih pristopov je potrebno bolje definirati cilje v razpisih za financiranje in spremeniti raziskovalno paradigmo
- Potrebnega je več povezovanja med sektorji na vseh ravneh, sestavljanja skupnih agend, oblikovanja skupnih ciljev in interesov glede raziskav - graditi je potrebo horizontalne, medresorske agende
- Razumeti, razvijati in uveljavljati je potrebno različne koordinacijske mehanizme
- Problem predstavlja dejstvo, da je včasih rezultate težko konkretno vrednotiti oz. meriti

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MANJKA FINANCIRANJE

- Celovitih interdisciplinarnih raziskav,
- Temeljnih raziskav
- Transdisciplinarnih raziskav - filozofskih, etičnih, konceptualnih raziskovalnih vprašanj
- Razvoja kvalitativnih meril in indikatorjev
- Raziskav specifičnih procesov in značilnosti odzivanja krasa
- Raziskav s področja povezovanja zdravja in prostora
- Kakovosti prostora
- Tematike tipologija rabe prostora,
- Tematike tipologija gradnje,
- Tematike terasaste krajine
- Tematike indikatorjev tveganj ob spremembah in odgovornosti ob dogodkih
- Tematike prostorskega razvoja in opremljanja stavbnih zemljišč

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OD VPRAŠALNIKOV DO OSNUTKA STRATEŠKE RAZISKOVALNE AGENDE

1. USKLADITEV PRIORITET IN NABOR PREDLOGOV ZA RAZISKOVALNE TEME
2. NABOR PREDLOGOV IN OBLIKOVANJE IDEJ ZA IZBOLJŠANJE POVEZOVANJA ZNANJA, POLITIK IN PRAKSE
3. NABOR PREDLOGOV ZA REŠEVANJE VPRAŠANJ FINANCIRANJA

Osnova za pripravo izhodišč za SRA v Sloveniji

Hvala za pozornost!

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Annex IX: Minutes from National Event

National conference with key stakeholders took place on 10. December 2015 in the City museum in Ljubljana. Due to the feedback from the invited Key stakeholders, the conference was organized as a one-day event. Around 30 participants were welcomed by the director of the UIRS and by the director of the directorat for the spatial planning, building and housing.

The conference was divided into three sessions. First session was dedicated to present in a short matter a scope of the INSPIRATION project, the INSPIRATION questionnaire (for those who haven't filled-in the questionnaire yet) and the preliminary results of the collected questionnaires.

Second session was dedicated to the collected research thematics, the possibilities for financing and for the transfer of the scientific knowledge into practice. Third session was dedicated to the formulation of the common issues/topics that have to be included in the Strategic research agenda for Slovenia.

There are three main conclusions from the event:

- The idea of preparing Strategic Research agenda for Slovenia for SSW system and for Land use, land use management was welcomed by all participants and expressed the need for more bottom-up approaches to collect real research needs from the end users.
- Many expressed the need of follow-up of the collection process and to be organized by UIRS, with the focus on research needs only. Namelly, many stakeholders expressed opinion, that the questionnaire was too long and too complicated. Also some stakeholders from larger institutions/companies that allready filled-in questionnaires, expressed interest to have a shorter version of questionnaire (including only questions 7,8 and 9) and to be translated in Slovenian, so that can be distributed companywide to more people. They suggested that the collection of this data would be possible also online and to become a non-stop process. (note: UIRS allready prepared shorter version and it was allready distributed after the conference – see annex IV, the online form is in preparation and will be available on http: //inspiration.uirs.si)
- Funding issues I: Currently there is no efficient funding mechanism in Slovenia in the field of Spatial planning, that would enable research for topics needed in practice. The good example of Targeter projects that were tendered in previous years in co-operation with Ministries (especially Ministry of environment and Spatial planning) and Slovenian Research Agency and covered also trans-sectoral topics needs to be reactivated. **Representatives from ARRS and Ministry of environment and spatial planning acknowledged the credit that we (project INSPIRATION and UIRS) encourage them to revive the former strong co-operation** in this field.

Annex X: List of participants from National Event

INSPIRATION
INTEGRATED SPATIAL PLANNING, LAND USE AND SOIL MANAGEMENT RESEARCH ACTION

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Nacionalni posvet ključnih deležnikov:

Strateška raziskovalna agenda Slovenije

za področja rabe zemljišč, spremembe rabe zemljišč ter za vplivne dele sistema prst - sedimenti - voda

Mestni muzej Ljubljana, Gosposka 15, 1000 Ljubljana
10. december 2015

List of participants

no.	Ime	Priimek	Organizacija	podpis
1	JENČA	A. ŠOLAR	MOP DPGS	
2	BARBARA	G. MARUŠIČ	UIRS	
3	BLANKA	BARTOL	MOP	
4	ARIANA	LIBERTIN	MKGP	
5	MILENA MARIJA	PLANINA	MKGP	
6	MATEJA	DREŽNIK	MOL	
7	INA-ŠILKYE	ERJAVEC	UIRS	
8	BARBARA	RADOVAN		
9	IGOR	BIŽAIL	UIRS	
10	BREDA M	MIHELIČ	– II –	
11	BARBARA	MUŠIČ	UIRS	
12	MATEJ	NIKŠIČ	– II –	
13	NATAŠA	RAVBAR	URS/Institut	
14			IZRK = za Krasoslovje	
15	URŠULA	BERNIK	URS	
16	BOŠTJAN	COTIČ	UIRS	
17	IVAN	STANIČ	MOL OUP	
18	Ljiljana	Orehovšek	– II –	
19	IGOR	ČETIN	URBANA RH.	
20	TINA	VUGL	ARRS	
21	TOMAŽ	BOSTOČ	USSGRM	
22				
23				
24				
25				
26				

14. Spain

Report by Pierre Menger, Gemma Garcia-Blanco, Efren Feliu

14.1 Executive summary

14.1.1 English version

As an outcome of the interviews and debates undertaken with Spanish National Key Stakeholders, it seems that there is a consensus on 4 of the suggested EU societal challenges, which have been recognized as particularly relevant in the context of the INSPIRATION SRA, even though priorities may vary greatly depending on the interests of the organizations, i.e. thematic fields,:

These challenges are, without an order of priority, the following:

- Food security and safety
- Secure supplies of safe drinking water
- Reduce raw material and resource consumption, Ensure efficient use of natural resources;
- Contribute to climate change mitigation and societal adaptation; (nuances can be found in the sense that some NKS may prioritize mitigation, others adaptation). It is commented that adaptation may entail major needs of R&I than mitigation

Beyond the above mentioned priorities, the Spanish NKS have also emphasised the need to consider other societal challenges that were not explicitly reflected in Societal Challenges of the EU. These challenges could be summarized as follows:

- Protection of biodiversity and ecosystem services, to contribute to healthy environment and resilience
- Society empowerment and co-responsibility in issues such as soil conservation, land management, and spatial planning.
- More balanced and equitable relation between rural and urban realities, towards improvement of cohesion and reduction of socio-economic inequities.
- New culture of territory which would englobe, on top of the above, innovative governance structures and democracy models, global awareness, and participatory planning, etc, resulting in a more sustainable territorial planning and management.
- Prospective planning (anticipation) as a mean to prevent rather than cure problems, especially in a world with fragile balance and instability
- Applying the “polluter’s pays” principle: importance of taking into account positive and negative externalities but also plan and design the procedures for assessment, evaluation and imputation to those who generate externalities.

Being conscious about the competitive strengths of Spain in specific sectors (i.e. biosphere reserves, National Parks, Water Management techniques in agricultural and market gardening sectors under semiarid conditions) due to its regional specificities and willing to maintain its leadership as ground for generating wealth and resilience in Europe, the Spanish NKS identified a series of issues under specific R&I priorities aligned with INSPIRATION themes. These were grouped in 4 overarching themes under which specific R&I needs could be formulated.

Innovation in science communication and awareness

Given the complexity of the soil-water-sediment system and its integration within spatial planning, improved and innovative means for knowledge diffusion are needed, working in a bidirectional way among the key actors of the R&I value chain, decision makers, scientists and citizens. This implies research on innovative dissemination methods and tools as well as tailored communication instruments for example on communication of risk and uncertainty, with transparency and in democracy, in order to achieve effective assimilation by- and empowerment of stakeholders. Given the fact that in Spain over 90% of companies are SMEs it seems crucial adapting the R&I system to such reality, creating the necessary incentives and support structures .

New governance, instruments and management mechanisms

Research on inclusive decision making and social empowerment is needed. R&I should explore new or improved ways to achieve real participation of society in decision making including (academia, general public, NGO, experts, practitioners and other actors with interest in land use and resource management).

Inclusive decision making may require improved governance structures and management mechanisms. Hence, there is still perceived the need for research on innovative governance structures, finding coherence between concepts, approaches and policies, and finding also methods capable to integrate the different roles of various parts of society, from technical experts (consultants and academia), politicians or decision-makers to the general public. Beyond the integration of stakeholders and interest groups, integration must seek consideration of legislative frameworks in place or under construction as outlines (i.e. Soil Framework Directive, Coastal Zone Management, Air etc.).

Integrated analysis and management

Spatial planning is considered *per se* an inclusive discipline aiming at the coordination of practices and policies affecting spatial organization, addressing population demands, resources management and environment, and infrastructures under a single research field. Despite progress made so far in the field there is still a need to value the interaction between two aspects: sustainability and planning. Given these premises, specific R&I topics were identified contributing to integrated analysis and integrated management, as follows: life cycle thinking applied to land use, ecological footprint and its relationship to bio-capacity, integrated approach to water, energy, soil, ecosystems and territory, mal-adaptation and its relation to the trinomial water-energy-territory, better understanding the impacts of simultaneous and multiples stressors, new technologies development and the territorial model, positive externalities of agroforestry uses, innovative territorial models, multifunctional approach to land uses and poli-functionality in the urban context, strengthen the relation between spatial planning and urbanism, adaptation to climate change, relationship between climate change and tourism, soil quality in relation to health and quality of life, green infrastructure, innovative and alternative metrics.

Specific technologies

Specific technologies were identified in support of the challenges and R&I priorities and themes mentioned above, These represent on the one hand the most relevant Spanish expertise but they also reveal great development opportunities. These technologies were grouped under the following headings:

- **Soft technologies hybridizing with traditional engineering -i.e.** Implementation of nature-based solutions mainstreamed into spatial planning; ecosystem based adaptation actions to climate change)
- **ICT knowledge applied to the development of early warning systems:** need of improving methodologies in land use planning and management with better consideration of risk parameters, i.e. vulnerability and risk due to impacts of climate change, floods, fire, and landslides
- **Water technologies:** Capture and storage of water from tillage and conservation, Water productivity and reducing water footprint impact, i.e.ICT applied to precision irrigation, deficit irrigation and wastewater reclamation, land use under a semi-arid or arid conditions, genetic adaptation of crops to increase productivity-and adapt to the availability of water, towards food security
- **Energy technologies:** Distributed energy generation and consumption/use, offshore wind power generation, and marine energy, potentials in terms of complementing installed capacities on land and reduce land needs for energy generation.

In relation to science policy interface in the Spanish context, the NKS highlighted that the interrelation between the 2 spheres is rather weak and if ever existing does seem not to have the impact that could be expected. Poor transposition of science outcomes into policy making or the non-alignment of R&I programs with the needs of researchers or end-users (i.e. industry, citizens, practitioners etc.) are examples of such weaknesses. Regardless to the specific bottlenecks for better interrelation between policy and science it is believed the interplay and communications means between all key actors, namely policy makers, universities, R&I / RTO centres, practitioners, private sector, NGOs and also citizens should be improved and incentivised at multiple levels. Improving the interrelation between policy and science would require the development of specific instruments for exchanging and communicating, setting priorities for R&I, evaluating R&I outcomes but also specific financial and human resources dedicated to develop solutions that would respond to the expectations of both communities.

Despite rather large experience with R&I funding mechanisms reported by NKS, there is a shared view on the need for: greater simplification of R&I procedures, especially in the European context (i.e. less emphasis and focus on administrative specifications and requirements and more focus on R&I value) and better visibility in terms of funding opportunities (i.e. mapping of funding opportunities). In terms of expectations, it is generally believed improved impacts of R&I funding could be achieved if R&I demand would be better assessed from start, meaning adequate instruments for information collection and transfer are urgently needed. This would imply the creation of specific instruments supporting the involvement of the private sector into R&I funding as it is believed R&I outcomes would find their way to markets more efficiently. All in all, independently of the development of new funding instruments, better governance systems based on improved integration of funding institutions and programs (horizontal integration) and organizational level (from EU to regional scale, i.e. vertical integration) are required.

14.1.2 Spanish version

Como resultado de las entrevistas y debates realizados con los NKS españoles, existe un consenso en torno a 4 de los retos de la sociedad de la UE sugeridas, que han sido reconocidos como particularmente relevantes en el contexto de la SRA de INSPIRATION, a pesar de que las prioridades pueden variar mucho en función de los intereses de las organizaciones, es decir, campos temáticos.

Estos retos son, sin un orden de prioridad, los siguientes:

- La seguridad alimentaria
- Suministro seguro de agua potable
- Reducir el consumo de materia prima y de recursos, asegurar el uso eficiente de los recursos naturales;
- Contribuir a la mitigación del cambio climático y la adaptación de la sociedad; (matices se pueden encontrar en el sentido de que algunos NKS pueden dar prioridad a la mitigación, otros a la adaptación). Se comenta que la adaptación puede implicar mayores necesidades de I+D que la mitigación.

Más allá de las prioridades mencionadas anteriormente, los NKS también han hecho hincapié en la necesidad de considerar otros retos de la sociedad que no se reflejaron de manera explícita en los retos sociales de la UE. Estos retos se podrían resumir de la siguiente manera:

- Protección de la biodiversidad y los servicios de los ecosistemas, para contribuir a un medio ambiente sano y a la resiliencia
- Potenciación de la sociedad y co-responsabilidad en cuestiones tales como la conservación y la gestión de suelos y la ordenación del territorio.
- Relación más equilibrada y equitativa entre las realidades rurales y urbanas, hacia la mejora de la cohesión y la reducción de las desigualdades socio-económicas.
- Una nueva cultura del territorio que englobe, además de lo anterior, estructuras innovadoras de gobernanza, nuevos modelos de democracia, una conciencia global y la planificación participativa. Se estima estas innovaciones resultarían en una planificación y gestión territorial más sostenible.
- Planificación prospectiva (anticipación) como un medio para evitar problemas en lugar de tratar problemas, especialmente en un mundo con frágil equilibrio e inestabilidad
- Aplicación del principio "quien contamina, paga": importancia de tener en cuenta factores externos negativos y positivos, sino también planificar y diseñar los procedimientos para la evaluación y la imputación a los que generan externalidades.

Conscientes de las ventajas competitivas de España en sectores específicos (i.e. reservas de la biosfera, parques nacionales, técnicas de gestión del agua en los sectores agrícolas y huertos en condiciones semi áridas) debido a sus especificidades regionales y dispuestos a mantener su liderazgo como base para la generación de riqueza y para la capacidad de recuperación en Europa, los NKS españoles identificaron una serie de temas específicos bajo prioridades de I+D alineados con los temas de INSPIRATION. Estos temas se asociaron en 4 grupos principales bajo los cuales se pudieron formular necesidades específicas de I+D.

Innovación en la comunicación de la ciencia y concienciación

Dada la complejidad del sistema suelo-agua-sedimento y su integración dentro de la ordenación del territorio, se necesitan medios innovadores y mejorados para la difusión del conocimiento entre los actores clave de la cadena de valor de la I+D, i.e. decisores, científicos y ciudadanos. Esto implica el desarrollo de métodos y herramientas de difusión innovadores así como instrumentos de comunicación adaptados, por ejemplo, en la comunicación del riesgo y la incertidumbre, con transparencia y democracia, con el fin de lograr la asimilación efectiva de los resultados de la I+D por las partes interesadas. Teniendo en cuenta el hecho de que en España más del 90% de las empresas son pymes parece fundamental la adaptación del sistema de I+D a dicha realidad, con la creación de los incentivos y estructuras de apoyo necesarios.

Nueva gobernanza, nuevos instrumentos y mecanismos de gestión

Se estima necesaria I+D en procedimientos de toma de decisiones abiertos y apoderamiento social. La I+D debería explorar formas nuevas o mejoradas para lograr la participación real de la sociedad en la toma de decisiones (incluidos los círculos académicos, el público en general, ONG, expertos, profesionales y otros actores con interés en la gestión de suelos y la gestión de recursos).

Es probable que sistemas de toma de decisiones abiertos exigieran una mejora de las estructuras de gobernanza y los mecanismos de gestión existentes. Por lo tanto, se estima necesaria investigación sobre estructuras innovadoras de gobernanza, buscando la coherencia entre los conceptos, enfoques y políticas, y buscando también métodos capaces de integrar las diferentes funciones de los diversos sectores de la sociedad, desde expertos técnicos (consultores y académicos), políticos o decisores hasta el público en general. Más allá de la integración de los actores y grupos de interés, la integración debe buscar la consideración de los marcos legislativos vigentes o en construcción (i.e. Directiva Marco de Suelo, gestión de zonas costeras, Aire, etc.).

Análisis y gestión integrada

La ordenación del territorio se define por sí como una disciplina integradora con el objetivo de coordinar prácticas y políticas que afectan a la organización espacial, frente a las demandas de la población, la gestión de los recursos y el medio ambiente, las infraestructuras y bajo un único campo de investigación. A pesar de los progresos realizados hasta la fecha en el campo todavía hay una necesidad de valorar la interacción entre dos aspectos: la sostenibilidad y la planificación. Teniendo en cuenta estas premisas, temas específicos de I+D capaces de contribuir a la gestión y el análisis integrado se identificaron bajo los títulos siguientes: enfoque de ciclo de vida aplicado al uso del suelo; huella ecológica y su relación con bio-capacidad; enfoque integrado para la gestión del agua, la energía, el suelo, los ecosistemas y el territorio; mal-adaptación y su relación con el trinomio agua-energía-territorio; comprender mejor los efectos simultáneos de estresores múltiples en suelos; las nuevas tecnologías y sus impactos en el modelo territorial; externalidades positivas derivadas de usos agroforestales; modelos territoriales innovadores; enfoque multifuncional de usos del suelo y poli-funcionalidad en el contexto urbano; fortalecer la relación entre la ordenación del territorio y el urbanismo; adaptación al cambio climático; investigar la relación entre el cambio climático y el turismo; entender la relación entre la calidad del suelo, la salud y la calidad de vida; infraestructuras verdes; métricas alternativas e innovadoras.

Tecnologías específicas

Se identificaron tecnologías específicas en apoyo a los retos, prioridades y temas de I+D mencionados anteriormente. Por un lado estas tecnologías representan la experiencia española más relevante y por otro lado revelan grandes oportunidades de desarrollo. Las tecnologías se agruparon bajo los siguientes epígrafes:

- **Tecnologías soft hibridándose con ingeniería tradicional** -i.e. implementación de soluciones basadas en la naturaleza incorporadas en la planificación espacial; acciones de adaptación al cambio climático basadas en los ecosistemas
- **TICs aplicadas al desarrollo de sistemas de alerta temprana**: necesidad de mejorar las metodologías de planificación y gestión del uso del suelo con una mejor consideración de los parámetros de riesgo, i.e. vulnerabilidad y riesgo debido a los impactos del cambio climático, inundaciones, incendios y derrumbes
- **Tecnologías del agua**: Captura y almacenamiento de agua de cultivos y conservación, productividad del agua y reducción de la huella hídrica, i.e. TICs aplicadas al riego de precisión, riego deficitario y recuperación de aguas residuales, gestión del uso del suelo bajo condiciones semiáridas o áridas, adaptación genética de cultivos para aumentar la productividad y adaptarse a la disponibilidad de agua, seguridad alimentaria
- **Tecnologías de energía**: generación y consumo / uso distribuido de energía, generación de energía eólica en alta mar, energía marina, posibilidades de complementar las capacidades instaladas en tierra y reducir las necesidades de suelo para la generación de energía.

En relación con la interfaz política-ciencia en el contexto español, los NKS destacaron que la interrelación entre las 2 esferas es más bien débil y parece no tener el impacto esperado. La mala transposición de los resultados de la ciencia en la formulación de políticas o la no alineación de los programas de I+D con las necesidades reales de los investigadores o usuarios finales (i.e. industria, ciudadanos, profesionales, etc.) son algunos ejemplos de tales debilidades. Independientemente de los cuellos de botella específicos para una mejor interrelación entre política ciencia se estima que los medios para la interacción y comunicación entre todos los actores clave, i.e. políticos, universidades, centros de I+D y centros tecnológicos, profesionales, el sector privado, las ONG y los ciudadanos deben ser mejorados e incentivados en múltiples niveles. La mejora de la interrelación entre política y ciencia requeriría el desarrollo de instrumentos específicos para el intercambio y la comunicación, el establecimiento de prioridades para la investigación y la innovación, nuevos modelos de evaluación de los resultados de la I+D y recursos financieros y humanos específicos dedicados al desarrollo de soluciones que respondan a las expectativas de ambas partes.

En base a la extensa experiencia con diversos mecanismos y programas de financiación por gran parte de los NKS, existe una visión compartida sobre la necesidad de una mayor simplificación de los procedimientos de participación, especialmente en el contexto europeo. Se espera menos énfasis y enfoque en las especificaciones y requisitos administrativos y mayor enfoque en el valor añadido de la I+D. En cuanto a expectativas, se estima generalmente que los impactos de I+D podrían ser mejorados si la demanda de I+D fuera evaluada de forma más precisa desde principio. Eso demuestra que se necesitan instrumentos adecuados para la recolección y transferencia de información. Estos desarrollos implican la creación de instrumentos específicos de participación del sector privado en la financiación de la I+D ya que se cree que de esta forma los resultados de la I+D llegarían a los mercados de manera más eficiente. Independientemente del desarrollo de nuevos instrumentos de financiación, se necesitan mejores sistemas de gobernanza basados en una mejor integración de las instituciones y de los programas de financiación (integración horizontal) y de los diferentes niveles de organización (desde la UE hasta la escala regional, es decir, la integración vertical).

14.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for Spain. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation”. In Spain, 20 NKS were interviewed, though in total 33 potential NKS were identified and contacted. For lack of specific interest, lack of availability or absence of any feedback, 13 organizations did finally not participate in this stage of data collection through interviews. A list of these 13 organizations is given in Annex Ia. In January 2016 a national workshop with NKS was held in Madrid in order to present results of collated information and jointly elaborate contributions to D2.5 for Spain. The agenda is provided in Annex IV. In total, 16 NKS had initially confirmed assistance for workshop but due to last minute agenda obligations finally 11 NKS attended the workshop. After the workshop a draft D2.5 report was sent to all 20 interviewed NKS for them to review it and send their comments. All in all, 6 NKS gave feedback (positive, giving approval to the draft document) and send some minor comments to be included in the final D2.5 draft version. Details on NKS are provided in Annex I. The desk study was based on documents as suggested by NKS. These are listed in Annex II.

14.3 Research and Innovation (R&I) needs

14.3.1 Societal challenges and needs

As expected, the priorities and issues of interest, related to the suggested societal challenges[28] vary greatly depending on the NKS background, i.e. professional activity, field of expertise, etc. However, it seems there would be a consensus on 4 societal challenges which have been recognized by the Spanish NKS as the most relevant ones in the context of this SRA:

These challenges are, without an order of priority, the following:

- Food security and safety
- Secure supplies of safe drinking water
- Reduce raw material and resource consumption, Ensure efficient use of natural resources;
- Contribute to climate change mitigation and societal adaptation; (nuances can be found in the sense that some NKS may prioritize mitigation, others adaptation). It is commented that adaptation may entail major needs of RTD than mitigation

Beyond the above mentioned priorities, the Spanish NKS have also emphasised the need to consider other societal challenges that were not explicitly reflected in the suggested ones. These challenges could be summarized as follows:

- Protection of biodiversity and ecosystem services, to contribute to healthy environment and resilience
- Society empowerment and co-responsibility in issues such as soil conservation, land management, and spatial planning.
- More balanced and equitable relation between rural and urban realities, towards improvement of cohesion and reduction of socio-economic inequities.
- New culture of territory which would englobe, on top of the above, innovative governance structures and democracy models, global awareness, and participatory planning, etc, resulting in a more sustainable territorial planning and management.
- Prospective planning (anticipation) as a mean to prevent rather than cure problems, especially in a world with fragile balance and instability
- Applying the “polluter’s pays” principle: importance of taking into account positive and negative externalities but also plan and design the procedures for assessment, evaluation and imputation to those who generate externalities.

[28] Societal Challenges as presented in the EU policy priorities of the Europe 2020 strategy

14.3.2 Topics / research needs to include in the SRA

Contextualizing research needs from the Spanish perspective

Spain is a pioneering example of a successful establishment of National Parks and Biosphere Reserves (being the 2nd country in the world with more biosphere reserves) and their involvement in climate change.

Spain is internationally recognized as a front runner in the development and implementation of new technologies in the fields of water management (i.e. reverse osmosis processes, water capture and storage from tillage and conservation, deficit irrigation, integrated water resource management (IWRM), land use in semiarid regime); this expertise finds its roots in the particularly hard climatic semiarid conditions Spain is submitted and the water demand related to its traditional strong agricultural and market gardening sectors. We believe such context makes Spain particularly interested maintaining such a leadership through sustained focused R&I especially under the growing threats of global warming and climate change. As overarching and transversal aim, it is considered as of high priority seeking territorial resilient systems facing global uncertainty (i.e. economic, social, environmental and particularly global warming). Other sectors in which Spain is frontrunner are: alternative energies (i.e. smart-grids, wind power generation, offshore/ marine energy, and photovoltaic solar energy) and high-speed rail transportation.

That is why it is utterly important to strengthen efforts in RTD on these sectors in which Spain is already well positioned, also to value the advances in specific technologies and to exploit the regional specificities and assets in southern EU (Barcelona Convention), so Spain could contribute to the increase of the productivity and resilience of Europe as a whole.

Two ideas were repetitively highlighted, during the interviews, and also during the workshop, as overarching issues to be added as backbones in the SRA:

- The consideration of soil as a limited resource and so, a key element to be protected and its conservation promoted. It is argued that soil is the forgotten part of natural sciences. Society is still lacking awareness about its utter relevance for enabling live (plants, animals, humans), and sustaining economy.
- The consideration of energy and its close link with water, soil and land management. In particular is has been argued that water availability, is highly dependent on energy. The technology for desalinization or reuse of waste water for instance, is ready for market uptake already. However, an integrated approach and better understanding of this binomial is still required. One particular NKS highlighted that. “The earth is not lacking water; the problem is that there is too much salt”.

Having in mind the societal challenges referred in the previous section, the major topics and research needs identified by the Spanish NKS are described below. They have been structured hierarchically as agreed during the workshop, under **4 spheres (hereafter labelled with ES#)**, from the more general topics to a more specific and problem- oriented research needs.

ES-1. Innovation in science communication and awareness

Decision makers and stakeholders from different sectors of economy and society, need to be aware of the reality of the problems in order to make responsible and effective decisions (i.e. resources at risk, risk due to degraded/contaminated land, impacts due to depletion of natural resources, biodiversity loss, dealing with uncertainty, etc…).

Specific research questions

- There is a need for developing culture of information dissemination from and towards decision makers, scientists and citizens so that awareness about issues of concern is facilitated. Such development would need the design of corresponding instruments (i.e. ICT, forums etc.) to enable such multidirectional and simultaneous dissemination and awareness rising.
- There is a need for reseach on innovative methods and tools for knowledge diffusion and tailored communication instruments for risk and uncertainty communication, with transparency and in democracy, to enable effective assimilation and empowerment.
- This implies the development of instruments *ad hoc* for different kind of actors and stakeholders, from policy and decision makers to general public and citizens. Here is remarkably important to incorporate SMEs in the RTD system, particularly in countries such as Spain with a highly specialized productive fabric and small and medium size enterprises.

Why: Better informed stakholders and actors at all levels, wich would enable supporting sound decision making (i.e. in participative processes) and avoid possible conflicts in the course of projects.

Overarching theme INSPIRATION: we estimate this issue is transversal accross the INSPIRATION themes of the conceptual model

ES-2. New governance, instruments and management mechanisms

There is still perceived the need for research on new gobernance structures, finding coherence between concepts, aproaches and policies, and finding also methods capable to integrate the different roles of various parts of society, from technical experts (consultants and academia), politicians or decision-makers to the general public. Beyond the integration of stakeholders and interest groups, integration must seek consideration of legislative frameworks in place or under construction as outlines; i.e. Soil Framework Directive, Coastal Zone Management, Air etc.).

Although, there are a number of successfull experiences, public participation is still a pending issue in the spanish context, in particular in relation with spatial planning and land use management.

Specific research questions:

- There is a need for research on inclusive decision making and social empowerment, exploring new or improved ways to achieve real participation of society in the decision including (academia, general public, NGO, experts, practitioners and whatever other actor with interest in land use and resource management).

Why: Research with respect to governance (including multi-level and multistakholder approach to decision making and public participation) is seen crucial towards the efficiency in the provision of services, specially with regard to common/shared needs and services from micro-municipalities and for better managing land use conflicts.

Overarching theme INSPIRATION: we estimate this issue is transversal accross the INSPIRATION themes of the conceptual model

ES-3. Integrated analysis and management

There is a general consensus on the importance of focusing great RTD efforts on understanding "state of the art" or "initial diagnostic / starting point" of a given issue/problem and its continuous update (i.e. soil, water, biodiversity, ecosystem health etc.), considering also the scale of assessment in every single concept, method, approach, process, etc. Only when the initial diagnostic is solid, may the correct decisions been taken and the impacts been measured and understood.

Spatial planning is considered *per se* an inclusive discipline aiming at the coordination of practices and policies affecting spatial organization, addressing population demands, resources management and environment, and infrastructures under a single research field. Spatial planning is seen as a key element for decarbonization and dematerialization, enabling reduced consumption of energy and natural resources and allowing the advance of society towards a territory and more sustainable way of life.

However, there is still a need to value the interaction between two aspects: sustainability and planning.

Integrated analysis and integrated management is required. Research in this area is linked mainly to the competences associated with the public sector and the following research topics have been identfied:

ES-3.1: Life cycle thinking applied to land use.

It relates to the efficient use of resources, i.e. the consideration of the 4Rs concept (reduce, reuse, recover, recycle) to non-marketable products such as land, and minimizing generation of waste and emissions).

- Need to develop a holistic approach in soil remediation and regeneration with an integral vision of all affected and interrelated compartments, (i.e. consideration of water, groundwater, bedrock, soil use, ecosystems)
- Interim use of brownfields needs better risk assessment and adapted regulation – need from municipalities – efficient use of soils, recycling of sites and brownfields, agile regulation and security for users
- Life cycle thinking cradle to cradle in the field of brownfield and contaminated land regeneration. Need for integral project planning taking into account wastes, end of life, risks, energy, landscape – Develop indicators for selection of BATNEEC techniques
- Assess opportunities for implementing soft re-use techniques (in the Spanish context there is a specific opportunity for valorizing bio-waste (among which compost) produced in excess)

Why: Land-use needs to be understood as a process with inputs and outputs. Land-use must be made more sustainable form a perspective of LCA thinking and taking long term developments into consideration

Overarching theme INSPIRATION: we estimate these issues above concern Demand, exploitation of natural capital

ES-3.2: Ecological footprint and its relationship to bio-capacity and especially its derivatives:

R&I topics

- Develop the concept of water footprint and implications on the types of crops to be seeded,
- Develop framework for linking footprint and biodiversity, i.e. footprints as a mean to measure externalities of biodiversity
- urban footprint unbound to population growth.

These issues are also closely linked to the disclosure and governance.
Overarching theme INSPIRATION: we estimate the issues above concern net-impacts,

ES-3.3: Integrated approach to water, energy, soil, ecosystems and territory.

This has been already highlighted as a backbone to be incorporated into the SRA.

R&I topics

- Need to improve the knowledge about water resources' fluctuations in relation to seasons, climate change, land uses and consumption from different sectors; i.e. agriculture, industry, services and homes
- Decentralized generation and use of alternative energy

Overarching theme INSPIRATION: we estimate these issues concern Natural Capital

ES-3.4: Mal-adaptation and its relation to the trinomial water-energy-territory.

R&I topics

- A holistic approach is necessary, to have the entire lifecycle of a particular action which could have unwanted derived negative impacts. This could be illustrated for instance in the case of water desalinization and the associated increase of energy consumption and on carbon emissions and its contribution to climate change.

ES-3.5: Better understanding the impacts of simultaneous and multiples stressors

(i.e. climate change, contamination, flood, drought, salinization, soil sealing etc.)on ecosystem services (special emphasis on soil ecosystem services)- objective is to improve risk assessment and management practices

R&I topics

- Assessment of multiple stressors on soil systems. Degradation of soils occurs rapidly, we need support for a better design of prevention and response strategies. In the field of environmental and especially soil ecosystem impacts there is yet not much knowledge about the understanding and evaluation of effects of multiple stressors or sources of perturbation, their interactions and interdependencies and their overall impact on biodiversity, functions of ecosystems and the resilience of these against multiple and simultaneous stressors. Generally impacts are assessed for a specific perturbation (i.e. contamination) but not for the overall impact of multiple sources of perturbation

(i.e. simultaneous effects of contamination, drought, compaction, defertilization etc.).

- Linked with the above, there is a need for developing multiple (i.e. hybride) risk assessment methods as support for better management of soil resources and better design and prioritization of corrective actions
- Resilience capacities of soil systems need to be better understood and evaluated in order to integrate natural responses as part of the solution

Overarching theme INSPIRATION: we estimate the issues above concern net-impacts

ES-3.6: New technologies development and the territorial model:

R&I topics

- Need of RTD to understand and explore the potentialities of new technologies development and their impact on the territorial model: associated to demographic changes and migratory processes, to urban- rural relationships and mobility.

Overarching theme INSPIRATION: we estimate the issues above concern Land management

ES-3.7: Positive externalities of agroforestry uses.

R&I topics

- It is important to investigate on the potential impacts of the extensive land uses and practices on the availability of resources (i.e. water, environmental services, etc.) at regional level and its economic valuation in relation to climate change adaptation and water cycle management.
- Need for developing new agricultural models and practices environmentally friendly and capable of limiting impacts like erosion, salinization, contamination etc.).
- From a more territorial equilibrium perspective, need to investigate and assess the structuring impact of rural activities and rural world
- Need for developing knowledge about the impacts of forestry sector on water resources – Need to develop good management practices in forestry sector for creating positive externalities on water resources
- Need for RTD to set monitoring strategies to better understand the influence of land management on the continental hydrological cycle, and therefore on the generation and availability of water resources of sufficient quality and quantity – special focus could be directed on better managing areas of land where river basins are recharged in water

Overarching theme INSPIRATION: we estimate these issues concern net-impacts

ES-3.8: Innovative territorial models.

Some concepts and approaches could be further explored in order to find new territorial models. These concepts and approaches are not new, but they require further research to be applied to the new challenges. i.e Integrated Coastal Management, Landscape analysis and planning, living areas (population and labour catchment areas), agro-ecology and urban agriculture, among others.

R&I topics

- In particular landscape planning and management is an ambitious concept. Considering all its components (diagnosis, evaluation, planning, and management, with a social, environmental, economic, institutional perspective) and its integrated approach to territory, is a topic/ research area, capable to enclose/encompass and cope with most of the EU societal challenges. The European Landscape Convention is the reference framework at EU level. At regional level, there is a wide range of applied research on landscape planning although complementary research is still needed, particularly the linkages with management and the design of adequate management instruments and definition of determinations.
- Integrated approach to food sovereignty and the role of urban and peri-urban agriculture with implications in resources management soil-land-water and in societal challenges. From a whole range of disciplines-– geography, agronomy, spatial planning, urbanism, landscape design, social sciences.
- Development of more comprehensive approaches for restoring ecosystems (estuaries, coastal) development of common indicators (or harmonized) for estuaries of a geographical area – this would entail the development of methods for evaluating the effects of global change (climate change, invasive species, air pollution) on the ecosystems of coastal areas, estuaries.

Overarching theme INSPIRATION: we estimate these issues concern Land management

ES-3.9: Multifunctional approach to land uses and poli-functionality in the urban context.

R&I topics

- It relates to circular economy in the sense that it aims at the optimization of land uses and urban processes, avoiding zoning and in favour of multi- and poli-functionality.
- This also relates to local agro-food policies and spatial/ and urban policies that include and reflect the multifunctional uses of land (i.e. urban food production) and have specific actions and resources to make it operational
- It implies the empowerment and utilization of public spaces and abandoned or disused spaces, in a multifunctional way.
- It requires the **consideration of public space as research topic in itself,** in the long term, being a community space of general interest

ES-3.10: Strengthen the relation between spatial planning and urbanism.

R&I topics

- There is need to investigate the relation among the strategic perspective at regional level and urbanism (zoning) at the local level.

Overarching theme INSPIRATION: we estimate these issues concern Land management

ES-3.11: Adaptation to climate change

To better inform and support the development and implementation of adaptation policies and related action programs at international, European and Member State level. It is well known that the local effects of climate change and the costs and benefits of adaptation vary greatly. Policy makers need to better integrate strategies for dealing with climate change into their development plans, rather than leaving them isolated as stand-alone policies and projects.

R&I topics

- Formulate criteria on mitigation and adaptation for its integration y spatial planning Hence, improve capacities for assessing vulnerability of specific systems, i.e. water resources, coastal zones, marine resources and ecosystems, terrestrial ecosystems and urban areas to climate change in relation with climate scenarios and support decision making (i.e. for example in the area of spatial planning)
- Investigate the links between climate change and the formation, depletion and exploitation of natural reserves of biotic and abiotic resources
- Understand better the role of ecosystem services as both mitigation (i.e. carbon uptake and storage) and adaptation (i.e. nature based solutions as measures for storm and flood regulation, impacts on water supply and food production) means.

ES-3.12: Relationship between climate change and tourism:

R&I topics

- This is a critical issue in coastal areas in particular and more research is required in terms of adaptation (beach defences, adaptation in residential areas)

Overarching theme INSPIRATION: we estimate these issues concern Land management

ES-3.13: Soil quality in relation to health and quality of life,

Must be explored.- This is particularly relevant when considering the close co-existence of people and degraded/contaminated land in highly populated and industrialized areas.

R&I topics

- Better understanding of the cause-effect relationship between soil degradation and health/quality of life would enable decision makers to manage land with more security on short medium and long term. Clear understanding and low uncertainty on health impacts would favor swift decisions and flexibility in delivering permits for specific uses on land for limited periods (interim use of land) and (if necessary) under specific servitudes.

Overarching theme INSPIRATION: we estimate these issues concern net-impacts

ES-3.14: Green infrastructure

As an integrated and multilevel concept/ approach and instrument which allows alongside governance, a better land management and resilience.
Overarching theme INSPIRATION: we estimate these issues concern Land management

ES-3.15: Innovative and alternative metrics

R&I topics

- It is true that metrics and evaluation mechanisms exist nowadays, linked to precise rules and legislation as water, soil, and so on. But still there are important gaps in relation to the up-take of research results in decision making and to reduce uncertainty.
- New metrics are required in response to new challenges i.e. climate change adaptation, ecosystem services). There is a need to better understand and monitor the relation between policies and soils uses and the derived impacts for resources, environment (i.e. ecosystem services) and society – i.e. climate change policies
- Need for developing a whole new “value” framework, enabling better balance of benefits vs costs (i.e. valuation of benefits on the long term are difficult to assess and are more often underestimated; i.e. “bank rate”, so that actual costs and benefits do prevail vs future benefits. CBA alike tools should give more weight to health and environment parameters vs economic parameters. Valuation frameworks should also take ethic parameters into account.
- There is a need for further research on the development indicators that better respond to regional specificities. This could be illustrated in the context of the WFD and the assessment of ecological state of water bodies. The regional specifies of certain water bodies and systems may require the development of specific indicators.
- New metrics are required which allows the objective evaluation of intangibles, and qualitative assessment
- Very important to include society in monitoring- land uses, state of soil/water in order to acknowledge the territorial reality.

Overarching theme INSPIRATION: we estimate these issues are transversal accross the INSPIRATION themes of the conceptual model

ES-4. Specific technologies

Specific technologies in relation to/ in support to the key issues mentioned above result in the following R&I topics:

- **Soft technologies hybridizing with traditional engineering** In the context of spatial planning there is an opportunity for reseach on soft technologies hybridizing with traditional engineering such as Nature-Based Solutions and Ecosystem Based Adaptation actions to climate change. RTD is needed to find out how and under which circumstances the best balance between soft and engineered solutions can be reached.

- **ICT knowledge applied to the development of early warning systems.** It relates to the need of improving methodologies in land use planning and land-use management with better integration/consideration of risk parameters, i.e. vulnerability and risk due to impacts of climate change, floods, fire, landslides, summer tourism peaks, depopulation etc. need of RTD for developing key indicators and associated metrics and threshold values. Need for short-medium and long term indicators depending on risk parameters

Overarching theme INSPIRATION: we estimate these issues concern Land management

- **In the context to water** the following technologies have been identified as the priority ones in need for further research and support:
  - Capture and storage of water from tillage and conservation – INSPIRATION theme: demand
  - Integrated water resource manangement- INSPIRATION theme land management
  - Water productivity and reducing water footprint impact, i.e.ICT applied to precision irrigation, deficit irrigation and wastewater reclamation – INSPIRATION theme: land management
  - Land use under a semi-arid or arid conditions – INSPIRATION theme: land management
  - Genetic adaptation of crops to increase productivity-and adapt to the availability of water, towards food security – INSPIRATION theme: land management
  - Reverted osmosis for water desalinization - INSPIRATION theme: demand
  - Waste water threatment in micro-municipalities- water treatment infrastructures should be designed in such a way as to provide services for multiple municipalities (i.e. shared services) and thus optimize the efficiency of public investements - INSPIRATION theme: demand
  - Research and development of aquaculture techniques as guarantee of secure food supply - INSPIRATION theme: demand
  - During flood events, water treatment plants' capacities can be exceeded so that water surplus needs to be direclty deviated to water courses without treatment. Procedures and methods for estimating the impacts of such practices on the

environment (i.e. soil, water bodies, biodiversity etc.) need to be developed in order to design possible mitigation and regeneration measures.
INSPIRATION theme: Net-impacts

– **In the context of energy**, there are several technologies in which Spain is a front runner and there is a need for further research and demonstration for the benefit of EU productivity and resilience:
    - Distributed energy generation and consumption/use..-
      INSPIRATION theme: land management
    - Offshore wind power generation, and marine energy, have great potentials in terms of complemeting installed capacities on land and reduce land needs for energy generation –
      INSPIRATION theme: land management
    - Photovoltaic energy production

14.3.3 Documents, research agendas and programmes underpinning these topics

At European level

- The European Territorial Strategy (ETE), seems to be nowadays an interesting umbrella with regard to land use and spatial planning issues, which unfortunately has not been able to be transferred into tangible policies
- The European Landscape Convention (ELC) addresses all transversal societal challenges defined by the European Commission.
- Horizon 2020, the EU Framework Programme for Research and Innovation (still lacking an appropriate coverage of environmental as well as demographic and social research themes).
- Water JPI – 2nd SRIA (under review, will be presented in May 2016) http://www.waterjpi.eu/
- FACCE-JPI; https://www.faccejpi.com/
- POCTEFA (Program for Territorial Cooperation INTERREG V-A ESPAÑA-FRANCIA-ANDORRA http://www.poctefa.eu/
- SUDOE – the Programme supports regional development in southwestern European countries, giving financial support to transnational projects through the FEDER funds. http://www.interreg-sudoe.eu/inicio
- MED: http://interreg-med.eu/en/home/, Partner States from 13 countries are working together in the transnational European Cooperation Programme for the Mediterranean area, The Interreg MED Programme 2014-2020. The transnational setup allows them to tackle challenges beyond national borders, such as the rise of low carbon economy, the protection of natural and cultural resources and the strengthening of innovation.
- European Environmental Agency –
- Territorial Agenda of the European Union 2020, http://ec.europa.eu/regional_policy/sources/policy/what/territorial-cohesion/territorial_agenda_2020.pdf

At National and Regional levels

- MINECO: National Program of R&I oriented towards Societal Challenges within the State Plan for Technical and Scientific Research 2013-2016. This Program contains several sub-programs. As an example, one of these sub-programs is oriented towards the food quality and security, sustainable agricultural practices, natural resources, marine and maritime research
- INIA: National Institute for Agronomic and Food Research and Technologies. Inside the national fundamental research program, INIA manages the subprogram of fundamental oriented research project in the field of agronomic resources and technologies y coordination with autonomic regions and complementary actions.
- RECUPERA 2020 Initiative: http://www.recupera2020.csic.es/, RECUPERA 2020 arises from the joint effort of nearly 40 research groups belonging to 9 CSIC centers located in Andalusia and the CSIC. The project will mobilize five million euros from CSIC, together with the twenty million that will be provided by the Ministry of Economy and Competitiveness, under the formula of a repayable advance of European FEDER funds, making a total of 25 million funding.
- Spanish Strategy for Climate Change and Clean Energy 2007-2020: http://www.magrama.gob.es/es/cambio-climatico/publicaciones/documentacion/est_cc_energ_limp_tcm7-12479.pdf
- At the level of the Basque country NKS signal the importance of the newly developed PCTI (Plan de Ciencia Tecnologia e Innovation 2020, i.e. Plan for Science, Technology and Innovation of the Basque Country 2016-2020).
- Environmental Framework Program 2020, http://www.ingurumena.ejgv.euskadi.eus/informacion/programa-marco-ambiental-2020/r49-5832/es/
- Basque Strategy for Climate Change 2050, http://www.euskadi.eus/contenidos/plan_programa_proyecto/klima2050/es_def/adjuntos/LineasEstrategicasEconomicasBasicasEVCC.pdf
- Planes de gestión del riesgo de inundación de la Demarcación Hidrográfica del Cantábrico Occidental y de la parte española de la Demarcación Hidrográfica del Cantábrico Oriental. 2016; https://www.boe.es/buscar/doc.php?id=BOE-A-2016-606

14.4 Experiences regarding connecting science to policy/practice

14.4.1 Use of knowledge

Scientific knowledge is defined as knowledge produced by scientific methodology. It is also conceived as a “dynamic process” which implies collection of data, analysis, methods but also ways of working, validation and contrasting, sharing, interacting and discussing with others. In relation to sources of scientific knowledge, all options are often considered by interviewed stakeholders. Obviously, knowledge generators may have greater interest in consulting exclusively scientific publications, but other sources are not excluded. Among decision makers and end-users, a wide range of sources are used.

The use made of scientific knowledge varies greatly depending on the nature of the NKS; i.e. it could be used for incrementing foreground needed to support further developments and new generation of knowledge, helping providing responses to specific societal questions and challenges. Further, scientific knowledge is used for the development of communication materials (to experts and non-expert public), technical guidance, legislation and eventually policies and other instruments (i.e. establishing limits/thresholds, design taxation systems etc.).

In relation to the extent to which state of the art scientific research is used for the formulation of policies, answers may vary greatly, depending on the perspective of the interviewed NKS, hence, if the NKS rather represents a knowledge producer or user/financer. From the perspective of knowledge producers it is generally believed the uptake of knowledge and its valorisation for policy making is quite weak and it is estimated there is a gap to be addressed. It is estimated improving the up-take of scientific knowledge for policy making would require the involvement of all key actors, namely policy makers, universities, RTD centres, practitioners, private sector, NGOs and also citizens. Despite this rather negative valuation of science transfer for policy making, it is estimated that most transfer and use of scientific knowledge has been made in rather conservative contexts, i.e. in which risks for end-users were rather small. This is believed is due to the nature of the Spanish productive tissue, generally composed of SMEs not really inclined in taking risks.

Other NKS highlighted some successful experiences in the use of scientific knowledge in the areas of soil (i.e. development of a contaminated soil law at national level through the Law 22/2011 of July 28th, on waste and contaminated soil and at Regional level (i.e. Basque Country through the Law 4/2015, of June 25th, for the prevention and correction of soil contamination). To some extend spatial planning policies have benefited from scientific knowledge valorisation (example of the Territorial Observatory of Navarra). However, despite the fact that scientific knowledge has been used to develop certain policies in soils, it has also been argued that Spain lacks strategic and holistic approaches for example to address the issue of contaminated land management (or more generally sustainable land use planning), thus giving non-scientific drivers (i.e. speculative – economic drivers, politics etc.) more opportunities to influence policy making. As a result, unsustainable land-use practices have been developed in the past. The sector of renewable energy is taken as example of the Spanish context to describe how little the scientific knowledge has been used for defining policies. The lack of scientific fundaments for the definition of policies seems to highlight a great gap in linkages between the policy makers and the scientific community in general.

14.4.2 Possibilities to set the agenda

Among the interviewed NKS, there seems to be a balanced representation of organizations that have the possibility to influence scientific research policies/agendas and those which have less opportunity to do so. Occasionally the different grade of influence may be related to the geographic scale; hence a regional organization may essentially influence RTD agendas at local level and will not have great influence at national level. Further, it has also been reported that the participation process for the elaboration of RTD agendas and programmes has not always been transparent from beginning to the end, meaning that final decisions are taken without having the opportunity to participate in that phase. This later point means that the grade of influence may also differ along the process, i.e. being strong at the beginning of the process (i.e. through consultation) and rather weak at the end, i.e. little opportunity to be involved in the decision making.

Similarly to the above capacity to influence RTD agendas, the global perspective of NKS is that RTD gaps still exist, meaning that policies/agendas do only partly respond to needs. Besides the fact that some NKS estimate this is partly due to effects of temporal trends in RTD priorities, it is also interpreted as the result of communication gap between policy makers on one side and RTD end-users / knowledge generator communities on the other side, i.e. a “system failure” which impedes RTD demands to reach policy makers. Possible reasons for such a valuation are manifold. Some of these have been gathered during interviews and have been commented during the national workshop. The workshop has been the occasion for NFP and NKS to synthetize major barriers and drivers for better synergy between RTD needs and RTD agendas/policies.

Given the complexity and variety of issues (i.e. drivers and barriers) identified among NKS, a consensus was found to organize these under 4 key items directly linked with the different steps of an RTD project life cycle. We believe these items could also fit to the level of RTD agenda/programmes as these are very similar:

1. Establishment of project’s specifications – defining the call (i.e. what issues need to be solved?)

Issue of concern – improvement suggestions

- Call outlines are not aligned with end-users’ specific needs. End-users should be involved in the whole elaboration process.
- Insufficient means for prospecting RTD needs: Financial resources should be dedicated towards forecast studies in order to better asses end-user needs for RTD
- There is little communication (i.e. transparency) on the definition of calls – means should be developed for media (i.e. also social media?) politics and scientists to meet and communicate on the call development process
- The object of RTD and its use are not always clear – Politics (i.e. policy makers) should explicitly inform about **WHAT** RTD they want to support and **HOW** (for what purpose) they will use the knowledge generated
- Relevance and valuation (i.e. possible impacts in €) of programmes are not assessed before final decision. There would be a need to set a validation step of calls and programmes in which a broad range of key participants could have room to participate.

2. Project development

Issues of concern – improvement suggestions

- Some key stakeholders (i.e. decision makers, end-users, society), are still not taking part in project developments. Means should be created for these stakeholders to be involved in all steps of project development in order to favour transparency and future knowledge transfer
- Projects with demonstration and pilots for testing and optimizing processes are strong communication tools, these should be promoted in RTD projects if possible
- High level consulting services are efficient in terms of impacts as outcomes are responding to very specific demands of RTD from specific “clients”. Such types of project should be more often developed and promoted
- Integrated project approach: regular information milestones with all interest groups (i.e. not only those linked to project contract) at beginning, during development and project closure should be scheduled. This would favour participative processes and make a broader group of stakeholders as part of future possible end-users of generated knowledge

3. Evaluation of outcomes and evaluation of RTD organizations

Issue of concern – improvement suggestions

- The evaluation of project outcomes should undergo a rigorous process so that results are taken as reliable and transparent. More participative processes would be recommended in order to improve transparency and reception among end-users.

4. Communication – Transfer of RTD outcomes to end-users and transfer of RTD needs to policy makers

Issue of concern – improvement suggestions

- RTD outcomes transfer processes and transfer objectives should be integrated in the project’s objectives more frequently
- Generally no incentive for RTD centres to dedicate huge resources for transfer of RTD outcomes beyond dissemination through scientific publication. It is estimated specific resources should be dedicated to transfer processes. Further, some NKS have commented the evaluation system of RTD centres may need to be reviewed and adapted in such a way that knowledge transfer activities are more widely incentivised, supported and recognised. It has been commented the academic barrier can hardly be overcome, meaning “non-purely academic” activities are not promoted.
- Experts for knowledge transfer are needed. These experts would be trained for communicating RTD outcomes towards different target groups; i.e. policy and decision makers, different end-users (i.e. industry, interest groups, society etc.)
- RTD on communication is needed (i.e. how to present outcomes of RTD projects). This would include specific issues like communication on uncertainties
- Exchange platforms between politics, scientists and society (in its widest meaning, also including media like TV, radio, newspapers, social networks etc.), networks or groups organized per fields of interest are missing, these should be created as support for dissemination but also as support for assessing specific needs of RTD.

Horizontally to the issues and items discussed during the workshop, it is estimated that **clear responsibilities** in each step of project/programme/agenda setting and evaluation should be established and entail formal consequences if objectives/compromises would not be achieved. It is generally assumed that agreements between science and policy should be relying on stability of RTD policies on the long term, which would in turn enable to build high profile researchers and high level RTD outcomes. While public governance, i.e. knowledge transfer from academia towards end-users in the areas of land use and planning is rather accepted, it seems public-private partnerships could be a mean to improve interventions in areas such as mitigation and adaptation to climate change. The living lab concept is believed to be an adequate "platform" for scientists and politicians to meet and both finetune RTD demands and needs, especially in areas related to land planning.

At the margin of the above discussions and during the interviews with NKS, it has been estimated that there is room for some specific needs to be addressed through fundamental non-oriented research programs. However, specific needs may not be specifically identified in program calls so that the relevance of specific topics must be well formulated (i.e. justified) by the bidder in order to convince evaluators of the needs and benefits of addressing specific topics.

Specific shortcomings in national policies/ agendas have been reported i.e. National Parks, Ministry of Economy and Competitiveness- Secretary of Research, Development and Innovation, INIA-National Institute of Food and Agriculture Research and Technology, where it is estimated resources and topics are directed towards obsolete fields. It has been commented key themes are included in calls or outlines of policies as key words but are barely visible in their implementation: i.e. quality of life, heathy environment, climate change, cohesion, etc. It is believed interest groups (i.e. lobbies) take advantage of the undefined determinations in the policies. The uncontrolled urbanisation processes and unprecedented irresponsible use of resources in the last decades, has been consequence of this blur and lack of definition.

14.4.3 Science – policy – practice

NKS interviewed have experience in the formulation of scientific research questions and in synthesizing scientific knowledge (both 65% of NKS). Almost all NKS (85%) have been involved in some form in activities of knowledge (co-)creation, either as core research organization or as stakeholder (end-user) involved indirectly in the project.

As it has been commented above under section 3.2, the transfer of RTD outcomes to policy sphere and economy is clearly a weakness in the Spanish system, as academic staff is not incentivised to participate in such activities. It is believed the academic system should be more supported to help transferring knowledge towards end-users and policy makers. Science/Communication experts would greatly help to such successful transfer.

In relation to the means for assessing societal impacts of scientific research there seems to be a shared estimation that this is unfortunately very weak in Spain. Although potential social impacts are addressed at the time of elaborating project proposals, these are not assessed systematically afterwards. Some may stress, the absence of impact assessment may be explained by the absence of sound diagnostic of the starting point situation. There are no ex-ante evaluations of social objectives neither are there ex-post social impacts evaluations. Even though it has been commented mechanisms and methodologies for

measuring impacts do exist it is believed political willingness is often lacking to implement these. Punctually it has been commented that existing methods for impact assessment may use indicators that are not of major relevance for citizens or society (i.e. indicators are related to growth and capital).

Nevertheless, besides this general situation, some experiences and indicators of assessment have been mentioned: these refer for example to the monitoring of publications, congress outcomes, spin-off creation, Intellectual Property Right, i.e. patents etc. In some case specific impact assessments have been mentioned, this concerns for example the economic impact of eco-innovation in the Basque Country (Impacto económico de la eco-innovación en Euskadi. Una aproximación cuantitativa, 2014) or the economic impact of the Basque Climate Change Strategy (2014). Even though the focus of the impact assessment was not directly related with INSPIRATION issues, the concept may be transferable.

In relation with existing science-policy-interface references, the analysis is rather negative. Several NKS report on the lack of such platforms and if they are aware about some, these are estimated as insufficient in order to enable efficient dialogue and transfer of needs and objectives in both directions. Hence, stronger platforms with clear structures need to be developed. In the case some experiences could be mentioned, these are for example consisting in working groups organized by ministries and specific departments of ministries, i.e. MINECO (Ministry of Economy and Competitiveness) and CDTI (Centre for Technological Industrial Development), MAGRAMA (Ministry of Agriculture and Environment) for example during the implementation phase of Directives. Working groups can be organised at national and/or at regional level, i.e. for example by URA (Regional Water Agency) for the definition of water management plans.

Despite this rather mitigated perception about the impact of existing exchange forums, at national scale some platforms offer politics and scientists the opportunity to meet and exchange on progress and needs in RTD; i.e. PTEA (Plataforma Técnologica Española del Agua: Spanish Technological Platform for Water: http://www.plataformaagua.org/), PLANETA (http://www.pt-planeta.es/) about environmental technologies; BIOPLAT (http://www.bioplat.org/main.html) about biomass technologies. Other platforms were cited in the areas of rural zones, i.e. plataforma rural (http://www.plataformarural.org/) , which encompasses the most critical views in the areas of agronomy and ecology, land stewardship platform as new ways for land and water management (http://custodia-territorio.es/). One of the NKS refers himself as possible platform between Science and Policy (this has been directly commented by BC3), however, its day to day work reveals this role is yet not completely assumed even though it is recognised such figures are crucially missing in the Spanish landscape.

Some NKs makes reference to instruments aimed at boosting innovation by creating demand for specific innovative solutions from the public sector, i.e. public innovative procurement. Such instruments i.e. linked to a project and hence a place where different stakeholders meet can be seen as a mean of science-policy interface.

14.5 National and transnational funding schemes

14.5.1 Funding schemes and possibilities for research funding

Overall, NKS report about large experience in the participation in funded RTD projects at EU, national and regional scale. References of funding schemes as identified through NKs and desktop work are collated in Annex III.

Current perceived constraints:

- **Complexity of the procedures with regard to participation in funded EU projects:** The NKS highlighted the need for easy the procedures for participating in EU projects so that resources could be invested more in knowledge generation and not that much in administrative tasks.
- **Lack of clear overview on EU funding opportunities**: local authorities as end-users may not always have a clear overview about EU funding opportunities for supporting RTD projects which could be particularly relevant for them. Hence, it was mentioned more information and essentially centralized information about EU and also national financing opportunities would be helpful for local authorities.
- **Underestimation of private funding on RTD:** Drivers for encouraging private enterprises to collaborate with academia have not been sufficiently investigated: Some NKS have commented on success experiences in funding of R & D in cases in which private companies and industry as research drivers have been considered (i.e. creating demand). This means the efficiency of private financing should not be underestimated. It is commented private companies have traditionally been responsible for much of the research that has been conducted at the university. But given a paradoxical situation privately funded research does not account for the academic and scientific curriculum, as would publicly funded research through official calls
- **Lack of research on Science-Policy interface**: So far, no or little funding for science– policy interface has come to light. It seems academic issues are well addressed in RTD calls, however, the development of interface instruments to facilitate the transfer of RTD needs and RTD outcomes is yet not subject of financial support.
- **Private-Public-Partnerships in RTD:** In the context of Spain, PPP financing schemes of R&I may not be valued as an attractive instrument especially for SMEs rather unwilling in taking risks in funding innovation. However, bigger companies like banks, insurances, construction and companies from the energy sector are believed to be more willingly involved in PPP funding schemes.

Solutions/ initiatives/ Suggestions for improvement:

- **Fundamental vs applied research:** It is commented public funding should generally be maintained for fundamental research support whereas for applied research other complementary funding instruments like Innovative Public Procurement should be enhanced with a participation of end-users essentially through time resources rather than money (i.e. co-financing with end-users). The Spanish Technology Platform for

Water believes that among other instruments, Public Procurement for Innovation mechanisms (or early innovative procurement) have capacity to drive innovation in the water sector; a special working group is dedicated to financing instruments (http://www.plataformaagua.org/index.php/grupos-de-trabajo/grupo-de-trabajo-5).

- **More strategic design of the funding schemes:** It is believed R&I strategies with perspectives of short to medium term returns should become more attractive to private sector with support of more PPP schemes whereas R&I with longer term returns should essentially be driven by administration and foundations (non-profit organizations) with indirect participation of private sector. It is suggested in the case of short term return a consensus should be found on how distributing benefits among beneficiaries, but with a compromise in returning part of the benefits into R&I funding. In order to simplify the establishment of PPP and trusting such funding schemes will develop further in the future it has been commented Spanish Public Research Organizations (OPI – Organismos Públicos de Investigación) may need some simplification of their structures and greater flexibility in their activities and objectives as those are often valued as complex and conservative.
- **RTD steered by managers and decision makers:** In terms of expectations, many comments from NKS address the need for decision makers and the knowledge generators to have better information on RTD needs from key stakeholders, i.e. end-users such as industry but also the society. This suggests, the financial resources for RTD should be steered by managers/decision makers on those R&I themes responding to real needs of end-user communities as it has been commented too often R&I funding ends up on projects lacking any way out to markets nor giving response to any specific need/demand. Financing programs must be designed in a way to give support to RTD specifically needed by industry and society. Funding programs and research projects in which government (managers, politicians, research institutions etc.), companies (consulting, technology centers, industry etc.) and society participate since the beginning should be promoted. Companies and society should not only be considered as recipients of the results but as actors in knowledge generation. Following trends worldwide on the emergence of alternative funding schemes, i.e. crowdfunding, philanthropy, it is believed such models could represent complementing instruments and a mean to involve society and private sectors on voluntary basis. Eventually such schemes could be incentivized by administration.
- **RTD service provision for specific RTD demand**: It is believed RTD service provision for specific RTD demand would offer better success for knowledge transfer. A solution is believed could be public funding to support customers requesting specific services to research centers. Another solution could be to encourage "high level consulting contracts" in which customers pay directly for research and thus would be interested in the results generated.
- **Cooperation** and willingness to share and collaborate are in the hands of the different stakeholders concerned. It seems to be essentially a problem of culture and political readiness to address issues from a different approach, i.e. more collaborative approach, including participative mechanisms.

- **Boost interaction between academia and politics:** Any ideas / initiative aimed to break the boundaries / barriers (i.e. ideological barriers, cultural, administrative, etc.) between academic and political worlds (also the company) would be useful: hence flexibility in determining indicators of success, of knowledge transfer, of mobility of people i.e. from academia towards industry and vice versa would be needed. The motivation for research institutions to generate impacts on markets is limited by lack of appropriate incentives (i.e. the academic evaluation system does not value). The indicators used to assess R & D follow the same patterns, i.e. they do not promote the coming together of academic and market indicators. Considering these circumstances, financing programs and economic instruments should be developed in order to create incentives for both “worlds” to get closer.
- **Improved RTD financing instruments** It has been commented RTD financing instruments should help to find a better equilibrium between purely market driven indicators and more social driven indicators. Hence, progressively, social sciences and impact indicators need to be developed and implemented; these indicators should reflect the value and importance of this parameter. If social dimension is left over, it is estimated RTD will become purely economically driven, which is believed would be a mistake that could have severe consequences for society.
- **More effective and impartial/fair evaluation process.** In the process of **evaluating** projects, emphasis should be put on the real impact that the project will have on the ground in relation to the defined objectives. On many occasions projects or parts of projects that have no real impact on the issues to be solved are equally financed. Such an assessment should also be made once the project is finished, depending on the results and their application and use by society.
- **Evaluation and control instruments need to be flexible and non-coercive**. The control should be applied especially in achieving the objectives. In relation to evaluation it was also commented that alternatively to projects as recipients of funding, research centers could become directly financed as experiences in the USA have shown (Michigan Research Council). It is estimated, the funding of research centers would leverage administrative controls as those performed in projects and give research centers a longer term perspective and hence more economic security compared to rather short term project funding schemes. In the area of natural sciences, medium or long term perspective is often required in order to fully understand and monitor impacts of actions and policies.
- **Project presentation in 2 phases should be more generalized**; this would save great resources by the R&I centers and associated partners. Further, some organizations despite their technical qualities are lacking experience in the preparation of EU projects often considered as administratively very heavy; support would be needed for them to prepare EU proposals.

- **Demonstration projects are crucial.** It is estimated added value could be increased through the promotion and dissemination of pilot or demonstration projects which are still much underrepresented in the Spanish context, and so the corresponding funding instruments. It was commented, the outcomes of funding programs (i.e. impacts) should be systematically measured with relevant and transparent indicators. It is suggested the non-compliance with pre-established objectives, should lead implications for program managers and performers of the projects. It is yet not clear what type of incentives should be applied, this would be subject for more debate among key actors. Questionnaire feedback and workshop debates indicated some ideas that could help incentivize public and/or private sector financing RTD and contributing to a better uptake of RTD outcomes in markets:
    - Creation of a bonus-malus system (i.e. taxation?) to which research and technology centers could be subject. This system would be linked to the degree of success of R & D project and the impact of the results on the market (i.e. companies).
    - Promotion of venture capital is also mentioned in the financing of R & D as an incentive to generate more value (i.e. R & D more market-oriented). The knowledge generated (i.e. assets, products) should be accompanied by business plans in the longer term.
    - Fiscal instruments could be developed in order to stimulate private sector investments in RTD
    - Creation of innovative taxes on specific products or services which could be redirected towards the financing of RTD (i.e. taxes on luxury products, high performance vehicles etc..)
    - Structural change of funding programs (i.e. greater involvement of private funds from banks and venture capital) and a cultural change within government and its relationship / partnership with the private sector and civil society is needed.
- **Governance of RTD funding** has been largely debated during interviews and the workshop. It is generally accepted that there is a great need to improve the governance and a need for designing new models. The backbone of governance should target better collaboration between funders, centers of knowledge generation and local administrations and companies. As an example of possible developments, the idea of an inter-regional office that could act to integrate the needs of various local authorities and materialize a demand for R & D was mentioned. Such entities would act as intermediates between the demand side and provider side of RTD. This would serve as driver for R & D economic activity GDP growth and social and economic impacts. Close to this idea, the following initiatives were mentioned during interviews and could serve as examples of drivers for stimulating RTD outcomes transfer to markets

- As an example for illustrating successful experience for knowledge transfer and added value generation, the COPIT program was commented. The COPIT Programme (Cooperation between Industrial and Technology Parks is an initiative of the Ministry of Industry, Tourism and Trade) has the support of the EOI Foundation, the Association of Science and Technology Parks of Spain (APTE), the Spanish Coordinator Polygons industrial (ECE) and ENISA. The COPIT program aims at articulating a network to promote business cooperation between companies and other institutions that generate technology in the environment of science and technology parks and companies located in industrial estates and clusters members of the Spanish Coordinator of Industrial Estates ECE.
- The concept of Business Improvement District can be an interesting way to facilitate the transfer of knowledge from the generators to users. A BID is a partnership between public and private entities in which the businesses of a defined area pay a bond or increase in their taxes in return for agreed improvements in the area (i.e. adapted legislation, taxation, transfer etc.). In some cases, the transfer of know-how and access to research results are part of the services agreed between the entities that compose them.

- **Promote and enhance researchers' exchange programs** between Spain and EU and the rest of the world. This would favor exchange of knowledge but also some exchange of culture and good practices in technical sphere as well as in governance systems (exchange on what you and how you do things).
- **Creation of fees:** for example associated with "polluter's pays principle" Fiscal policies could include taxation schemes for certain industrial and economic activities that would pay specific differentiated fees exclusively dedicated to research funding
- **Alignment across policies, moratorium in construction sector**: links between research policies and other policies could be important and should be explored. For instance, immigration and refugees hosting initiatives could be a source of incorporating additional research capacities for certain countries. Another example is that research priorities should be coherently aligned to national structural economic development policies, e.g. avoiding conflicts if funding research in the construction sector when this sector should be losing importance and weight in the Spanish GDP after the economic crisis.

14.5.2 Gaps in financial resources for research

Based on the outcomes of interviews and debates during the workshop, it could be generally accepted that funding resources exist for the majority of R&I areas. Some gaps may exist for the following issues; i.e.:

- Environmental psychology and perception (i.e. developing communication procedures and instruments as well as language for transmitting RTD outcomes to citizens and society. Especially developing knowledge around the perception of environmental problems and its integration into decision making procedures)
- Basic funding is needed for the generation of basic knowledge on soils, which currently is not fancy: this should address cartography, soil properties, hydrological cycle monitoring and other aspects such as erosion and sediment transport. Water resources: source zones where the water enters river basins, i.e. areas of mountains are not analyzed. (ICONA before had more territorial approach to the management of water) river basin management does not exist today because skills are compartmentalized at more local levels.
- efficient use of water in agriculture (water saving)
- from the perspective of regional financing opportunities, all issues not valued as priority in the RIS3 strategy (i.e. often related to natural resource, microbiologic biodiversity in soils)
- R&D&I on landscapes
- Innovation in the evaluation and interpretation (i.e. value for end-users) of RTD results
- The transfer of R&I outcomes and design of innovative instruments for promoting collaboration among key actors of R&I needs special attention and financial support, either through subventions or incentives of different kinds (fiscal advantage, rewards for academia etc…).

In relation with Spanish R&I priorities and key challenges mentioned under section 2.2. above, it is worth mentioning the breach sometimes identified between these priorities and those (maybe more generic) established in some Research and Innovation Strategies for Smart Specialization (RIS3) at national/regional level. Indeed, some NKS have shared the impression that RIS3 strategies may “favor” traditional industrial sectors (i.e. production, also including agriculture and market gardening) as potential key vectors for employment and growth, leaving sometimes those sectors closer to natural sciences, nature conservation, biodiversity and ecosystems etc. aside. As it seems Funding opportunities through FEDER funds will strongly depend on RIS3 priorities set al MS level, there is concern some R&I priorities not directly linked with RIS3 might struggle getting funded through regional and/or FEDER mechanisms.

Poor support from funding communities for integrated approaches is generally interpreted as a structural as well as cultural problem in the Spanish context.

Spatial planning projects that are funded often have a still very sectoral approach. Multidisciplinary and transdisciplinary projects have been marginalized by lack of knowledge and political will to understand the importance and relevance of integrated approaches particularly in the issues addressed by INSPIRATION.

The landscape could be the solution in terms of funding integrated approaches and an answer on how to manage land use, soil -water-sediments system

It is estimated that public funding models and administration organization foster compartmentalization of research in sectors and disciplines, thus impeding transversal and integrative approaches on complex issues. It is estimated that an approach from the perspective of the company or companies that take into account the demands and needs of society would address the investigation from a more transversal and integrated perspective and enable to respond to specific problems. Co-participation of different private and public institutions from different sectors and disciplines would be necessary.

It is believed demand of RTD should be integrated as a request to give support to solve integrated problems. An example of integration comes from Integrated Environmental Permits. In relation to the areas covered by INSPIRATION, it is estimated a more integrated soil-water system approach is missing. Water management is limited to the channels and the area of hydraulic domain. Hence, it is necessary to understand the whole problem from a holistic perspective in order to formulate a holistic problem and associated R&I need. It is suggested technical, social and economic dimensions should be considered.

To address all these dimensions, it would be very helpful to create forums where the scientific community together could have the chance to debate with funding institutions on the RTD priorities and the complexity of the system.

14.6 Other remarks made by interviewees

In general, the NKS appreciate very much this type of consultation as they feel that they are taking part in an ambitious objective which definitely requires the involvement of multiple actors from different fields of expertise and from different countries. The mix of scientific, policy and financial issues addressed is appreciated as these need to be integrated in order to maximize the impacts of the RTD generated at national and international level.

The NKS remarked the importance of contextualizing the RTD in relation to the peculiarities of the spatial planning systems as well as the policy landscape and specific regulation in each country, which could represent a constraint for the realization of certain initiatives. Unlike other EU countries, the land in Spain has a speculative value, recognized by the Land Use Law that any capital gain/added value goes the owner and not to the society, which has and will have an impact when launching any kind of initiative and making the urban procedures so complex.

Finally, the fact that there are not networks for soil monitoring in Spain has been identified as a big gap for designing any ambitious RTD program to enable the measurement of the impact of contamination and human activity.

14.7 Annexes

Annex Ia: NKS interviews in Spain

Date of interview	Organisation	Interview	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
22-07-15	NEIKER	Dr. Carlos Garbisu			1		1						1	1	1	
01-10-15	IHOBE	Ana Alzola, Ignacio Quintana	1	1		1					1		1	1		
12-11-15	OCT	Dr. Verónica Hernández								1						1
17-11-15	OTN	Dámaso Munárriz	1	1		1										1
27-11-15	IDOM	Anonimous		1					1		1		1		1	1
12/01/16	Bilbao Council	Enrique Rincon		1		1							1			1
18/01/16	CIEMAT	Rocio Millan Gomez			1		1						1	1		
09/12/15	MCRIT	Andreu Ullied		1					1							1
19/01/16	CSIC	Santiago Begueria Portugués			1		1						1	1	1	
15/12/15	CSIC	José Enrique Fernández Luque			1		1						1	1	1	
14/12/15	OECC	Jose Ramon	1		1	1							1	1	1	1

		Picatoste														
2/12/15	MAGRAMA	Antonio Callaba		1		1							1	1		
18/12/15	SPRILUR	Jose Miguel Artaza		1	1				1				1		1	1
22/01/16	AZTI	Javier Franco		1			1							1	1	
8/01/16	BC3	Ibon Galarraga			1		1						1		1	1
21/01/16	URA	Iñaki Arrate														
4/12/15	FUNDICOT	Antonio Serrano									1		1		1	1
17/12/15	Independent – Formerly University of Madrid	Domingo Gómez Orea		1	1		1					1	1		1	1
1/12/15	University of Valencia	Joaquin Farinós Dasí			1		1									1
21/01/16	CEDEX	Fernando Segues			1		1									1

Further contacted organizations

Organization name
Fundación Biodiversidad
Spanish Federation of Municipalities and Provinces (FEMP)
School of Geography University of Granada
Geography Department of the University of Alcala de Henares
Climate resesarch foundation
Government of Andalucia
Government of Galicia - Land planning Department
Government of Navarra
Catalan Landscape Observatory
AGBAR (corporation)
TRAGSATEC
Comunidad de Madrid
Puertos del Estado – Harbours of the State

Annex Ib: NKS questionnaire template

Questionnaire template in Spanish – Answers to questionnaire have been transcript on paper in Spanish language – they are available on request

A. Información entrevistas
País: Nombre de la persona representando INSPIRATION: Fecha de entrevista: Como desea el entrevistado ser citado?: *[Anónimo, opinión personal, opinión de la empresa/organización].*
B. Introducciones
C. Información sobre el NKS
1. Nombre-Apellido: 2. Nombre legal de la Organización: 3. Cargo/posición en la organización:
4. Tipo de organización (multiples respuestas posibles) ○ Autoridad nacional – regional - local ○ Universidad / Centro de Investigación ○ PYME (i.e. < 500 empleados) / consultora ○ Industria ○ ONG ○ Representación de una red ○ Otro - especificar: …
5. Áreas de expertise (múltiples respuestas posibles): *[preguntar por experiencia especifica en los diferentes temas]* ○ Suelo ○ Agua ○ Sedimentos ○ Planificación urbana / planificación territorial-espacial ○ Diseño de paisajes ○ Gestión del suelo – gestión del territorio ○ Otros, especificar: …..
6. Vuestra organización financia investigación a terceros? ○ Si. Por favor, especificar: ... *[e.g. como gestor del programa, público, privado, …]* ○ No

D. SRA

7. Cuáles son los retos de la sociedad que usted valora como importantes?

   [retos de la sociedad definidos por la *Comisión Europea. Estos son*:]

   - Contribuir a la seguridad alimentaria
   - Asegurar un suministro seguro de agua potable
   - Asegurar un suministro y distribución de energía seguros
   - Reducir el consumo de recursos y materias primas
   - Asegurar el uso eficiente de los recursos naturales
   - Contribuir a la mitigación del cambio climático y la adaptación de la sociedad
   - Contribuir a un entorno de vida saludable
   - Asegurar infraestructuras seguras.
   -

   [estos retos servirán para definir los temas estratégicos que servirán para agregar los topics de investigación de la futura SRA.]

   a. Si aplica, cuáles serían otros retos sociales importantes a considerar?

   [i.e. conservación de los espacios naturales, uso sostenible de los servicios de los ecosistemas, mitigar la pérdida de biodiversidad etc.]

8. En base a vuestra experiencia: qué temas específicos (necesidades de I+D) deberían ser incluidos en la SRA?

   [Para cada tema, seguir con las sub-preguntas a. b. y c. Estas sub-preguntas son mandatarias, las demás sub-preguntas son opcionales.]:

   a. Explicar la razón de incluir este tema
      - *Qué ámbitos estarían afectados? Quién estaría afectado (en la sociedad)?*
      - *Quién sería responsable de llevar este tema adelante?*
      - *Sería este tema de interés para vuestra organización / departamento?*
      - *Se trata de un tema fundamentalmente de interés nacional o sería este tema de interés para varios países?*
      - *En qué punto se encuentra la ciencia en este tema – estatus quo- cuáles serían los objetivos a medio/largo plazo?*
      - *En qué/como podría el conocimiento generado ser utilizado eficientemente?*

   b. Prioridad:

   Prioridad muy alta

   1. *Prioridad alta*
   2. *Prioridad media*
   3. *Prioridad baja*
   4. *Poca/ninguna prioridad*

5. Cuál es la urgencia de trabajar en este tema? i.e. qué pasaría si este tema siguiera siendo ausente/minoritario en los programas de I+D?

c. c. Qué instituciones se deberían responsabilizar de financiar la investigación en este tema?

Otros temas adicionales ¿

- *Estimación de los recursos de suelo*
- *Productividad potencial del suelo*
- *Demanda de recursos suelo/terrenos, importación and exportación*
- *Competencia entre usos de suelo (conflictos en usos de suelo)*
- *Conceptos para identificar y cuantificar impactos relevantes*
- *Instrumentos para mitigar/evitar impactos (útiles en procesos de toma de decisión)*
- *Oportunidades para nuevas tecnologías de gestión de usos de suelo*
- *Sistemas de gestión de suelos orientados a la gestión de recursos*
- *Regeneración de suelos*
- *Recuperación de suelos y aguas subterráneas*

9. <u>En relación a los temas mencionados por los NKS:</u>

a. Cuáles son los documentos importantes / relevantes, agendas de I+D, programas de I+D que sostengan estos temas? (estado del arte)

b. En relación a estas agendas y programas: cuales son las cronologías de los programas y las oportunidades de poder influir en estas agendas / programas?

E. Interrelación Ciencia-política - Science-Policy-Interfacing (SPI)

10. Cómo definiría usted “conocimiento científico”?

11. Con qué fines utiliza usted el conocimiento científico en su trabajo?

12. Qué fuentes de conocimiento (científico) utiliza usted en el marco de su trabajo?

[Pregunta abierta, se pueden mencionar las fuentes siguientes como ejemplos]

- *Publicaciones científicas*
- *consultores*
- *informes*
- *colegas*
- *experiencias / ejemplos en mi país*
- *experiencias/ejemplos en otros países*
- *periódicos*
- *televisión*
- *conferencias, participación en proyectos de investigación*
- *bases de datos*
- *páginas web, por ejemplo: …..*
- *otros, especificar: …..*

13. En qué medida utiliza usted conocimiento científico puntero para el desempeño de vuestro trabajo? (estado del arte en ciencia, descubrimientos etc.)

14. En qué medida tiene usted la posibilidad de influir (precisar de qué forma) en la definición de políticas/agendas de investigación en vuestro país?

15. En qué medida nuestras políticas y programas nacionales de investigación reflejan vuestras necesidades específicas de I+D y prioridades?

16. Según vuestras experiencias, en qué medida se ha aprovechado el conocimiento científico para la definición de las políticas existentes en España?

[Preguntas para NKS ajenos a instituciones científicas, i.e. sectores políticos, industria/mercado]

17. Alguna vez ha sido usted implicado en:
    a. La formulación de preguntas/programas científicos?
    b. Investigación científica? (i.e. co-creación de conocimiento)?
    c. síntesis/compilación de conocimiento científico? , e.g. para alimentar procesos de elaboración de políticas, crear y mejorar oportunidades de negocios?

[Si la respuesta es "SI": preguntas adicionales]

- Qué grado de éxito ha tenido el proceso? Qué satisfacción ha tenido usted de esta experiencia? Especificar en una escala de 1-5?
    1. *Muy exitoso / muy satisfactorio*
    2. *exitoso / satisfactorio*
    3. *Neutral*
    4. *Sin éxito / sin satisfacción*
    5. *Muy mala experiencia*
- Cuales han sido los aspectos más exitosos/positivos?
- Cuales han sido los aspectos mejorables?
- Qué se debería evitar?
- Otros comentarios?

[Preguntas para NKS que pueden tener entendimiento/conocimiento en el área, i.e. financiadores de la investigación]

- En qué forma está evaluado el impacto social de la investigación en los temas de interés de INPISRATION en nuestro país?

[Si pueden responder a la pregunta anterior; preguntas adicionales]

- Qué grado de éxito tiene el sistema de evaluación en una escala de 1-5?
    1. *Muy exitoso / muy satisfactorio*
    2. *exitoso / satisfactorio*
    3. *Neutral*
    4. *Sin éxito / sin satisfacción*
    5. *Muy mala experiencia*
- Qué indicadores se utilizan?
- En qué aspectos el sistema parece ser muy eficiente?
- Qué aspectos podrían ser mejorados?
- Qué se debería evitar?
- Otros comentarios?

18. ¿Existen a nivel nacional referencias y/o instrumentos de apoyo (documentos escritos, webs, grupos de soporte, plataformas etc.) enfocados en las interrelaciones "ciencia-política"? Podría usted recomendar alguna referencia?

F. Financiación

19. Qué experiencias y qué expectativas tiene usted en relación a esquemas de financiación (públicos/privados) en vuestro área de especialización y que podrían ofrecer oportunidades de investigación en temas de uso y gestión del suelo y los impactos en el sistema suelo-sedimento- agua:
    - A nivel sub-nacional / regional?
    - A nivel nacional?
    - A nivel Europeo? [*e.g. H2020, Interreg, multi-lateral como el Joint Programming Initiatives*]
    - Internacional? [*e.g. Belmont Forum, Fundaciones etc.*]

    [Para todas For all R&I questions aiming at achieving policy targets in the Land & SSW related system (like e.g. Sustainable Development Goals on soils -to be adopted at UN level in September 2015-, existing EU directives such as the Environmental Liability Directive, etc.) Consider all Public and Private funding sources. Please ask to provide details and give most important references (documents, website) that could be relevant for explaining the answer]

20. Como mejorar el valor añadido generado por los resultados/impactos de diferentes programas de financiación (i.e. aumentar el efecto multiplicador) para una investigación que responda a las necesidades nacionales y de la Unión Europea, en particular las necesidades en I+D en los temas relevantes en INSPIRATION (i.e. territorio, y el sistema suelo-sedimento-agua)
    [*ejemplos podrían ser: PP, PPI, etc. …preguntar de forma abierta, sugerencias, ideas, experiencias, buenas practicas etc.*]

21. Sabe usted si existen áreas de I+D+i que no estén todavía contemplados en los esquemas de financiación actuales y para los cuales nuevos y diferentes mecanismos de financiación deberían estar puesto en marcha?

22. Enfoques científicos integrados (especialmente relevantes para abordar los retos de la sociedad vinculados con el uso y gestión del suelo y el sistema suelo-sedimento-agua) son generalmente difícil de financiar o ser reconocidos por parte de las comunidades de financiadores de la investigación. Qué acciones/programas serían necesarios para mejorar esta situación?

23. En base a experiencias previas de programas de financiación, cuales serían las buenas practicas para diseñar y gobernar/gestionar instrumentos de financiación de tal forma que i) los resultados de la I+D pudieran satisfacer las necesidades de la sociedad, ii) el conocimiento generado por la ejecución de la SRA sea absorbido y utilizado en la economía y iii) el dinero invertido por los financiadores/inversores sea remunerado (con efecto multiplificador)

    [si se proporcionan respuestas a la pregunta anterior: preguntas adicionales]

- Qué grado de éxito tiene el sistema de evaluación en una escala de 1-5?
  1. *Muy exitoso / muy satisfactorio*
  2. *exitoso / satisfactorio*
  3. *Neutral*
  4. *Sin éxito / sin satisfacción*
  5. *Muy mala experiencia*
- Cuales son los elementos positivos de estos programas, i.e. en qué aspectos el sistema parece ser especialmente eficiente?
- Qué aspectos podrían ser mejorados?
- Qué se debería evitar?
- Otros comentarios?

G. Otros aspectos (comentarios, sugerencias, ejemplos):

H. Finalizar la entrevista

Hay interés para recibir información sobre los avances de INSPIRATION?

Sugerencias para entrevistar otras personas?

Preguntas / comentarios relativos a la entrevista?

En qué tipo de información está interesado y estaría dispuesto a dar Feedback?

a. Tipo de información e interés para dar feedback
   - Entrevista completa
   - Resumen de las conclusiones más relevantes
   - Informe nacional, contribución nacional a D2.4
   - Informe completo D2.4, con las aportaciones de todos los países

b. Tipo/Nivel de feedback:
   - no feedback
   - feedback informal
   - feedback formal (e.g. por parte de la organización representada)

INSPIRATION acknowledges the received funding from the European Community's HORIZON2020 Framework Programme under grant agreement no 642372

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

INSPIRATION interview at a glance – (Spanish version)
Información y antecedentes del proyecto INSPIRATION

Objetivo de INSPIRATION:

El objetivo principal del proyecto INSPIRATION es la formulación de una agenda de investigación estratégica (SRA) definida a partir de las necesidades de los usuarios finales. La SRA estará enfocada en los ámbitos del uso del suelo y los compartimentos afectados con cambios de uso, i.e. el sistema suelo-sedimentos-agua. La SRA persigue el objetivo de sentar las bases de las respuestas a los retos y necesidades de la sociedad actual y futura[29]. Además, el proyecto tiene como objetivo de definir los modelos de aplicación de la SRA y preparar una red de instituciones públicas y privadas de financiación dispuestas a financiar comúnmente la ejecución de la SRA.

Agentes Claves Nacionales – (i.e. National Key Stakeholders -NKS):

En una serie de entrevistas con agentes claves nacionales (i.e. en inglés National Key Stakeholders .- NKS) los "Puntos Focales Nacionales (i.e. en inglés National Focal Points, NFP) socios de INSPIRATION colectan información nacional relacionada con el alcance de INSPIRATION (i.e. uso y gestión del suelo, sistema suelo-sedimentos-agua) desde las perspectivas siguientes:

- Necesidades de Investigación e Innovación (I + i)
- Experiencias en relación con la conexión entre ciencia y política/práctica
- Planes de financiación nacionales y transnacionales

Las entrevistas están dirigidas a personas que tengan una visión general sobre oportunidades y demandas de conocimiento (a corto, medio y largo plazo). Se valora que los NKS estén participando en redes profesionales pertinentes, idealmente con el fin de poder actuar como embajadores de INSPIRATION en el futuro.

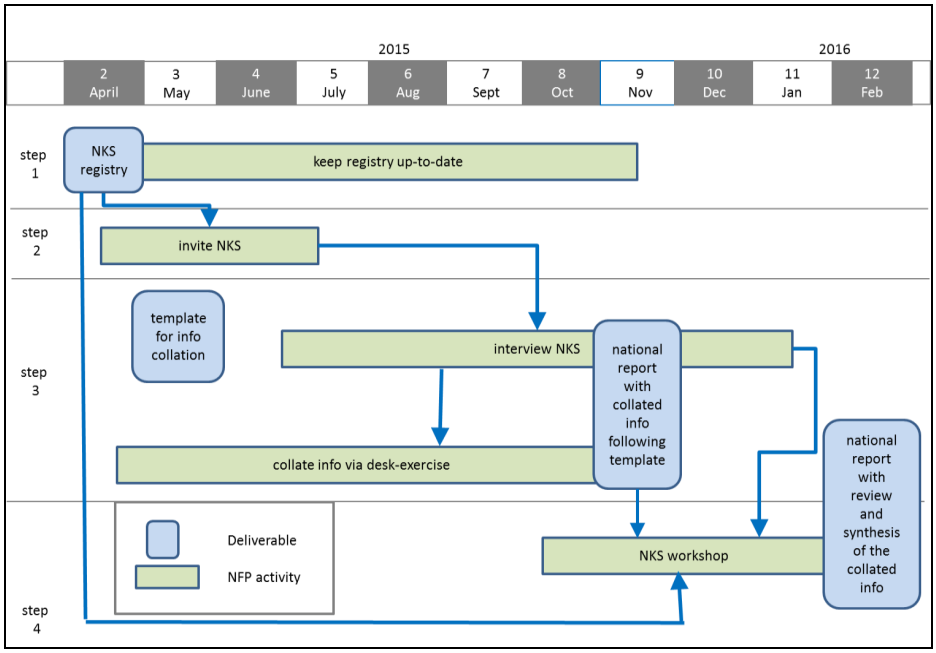
Los NKS elegidos representan diferentes disciplinas y procedencias institucionales, incluyendo: gestión del uso del suelo, planificadores; gerentes; expertos de suelos, sedimentos y agua; investigadores, financiadores y reguladores / responsables políticos

[29] En el contexto de INSPIRATION, reconocemos los retos de la sociedad tal como se define en el contexto del programa HORIZONTE 2020. INSPIRATION derivará una SRA para abordar estos retos a través de usos del suelo más sostenibles y eficientes y una gestión basada en una comprensión más profunda de los compartimentos afectados del sistema Suelo-sedimento-agua (SSA). Estos retos son los siguientes:
•Contribuir a la seguridad alimentaria;
•Asegurar un suministro seguro de agua potable;
•Asegurar un suministro y distribución de energía seguros;
•Reducir el consumo de recursos y materias primas;
•Asegurar el uso eficiente de los recursos naturales;
•Contribuir a la mitigación del cambio climático y la adaptación de la sociedad;
•Contribuir a un entorno de vida saludable;
• Asegurar infraestructuras seguras.

Las entrevistas:

Vuestras contribuciones son una parte clave para la ejecución del proyecto ya que permitirán describir el estatus quo en materia de I+D en nuestro país y sentar las bases de una nueva agenda de investigación europea. Las entrevistas se estructuran en una serie de temas y preguntas: Los resultados de las entrevistas de NKS (aproximativamente 20 por país) y de la recopilación de bibliografía sobre las necesidades de investigación y las posibilidades de financiación serán sintetizados en un "informe nacional". Esta síntesis será objeto de revisión en el marco de un taller nacional que se celebrará en el cuarto trimestre de 2015. El objetivo de este taller nacional será de identificar los temas prioritarios para ser considerados en la Agenda Estratégica de Investigación sugerido (SRA) desde el punto de vista de España. Los informes nacionales servirán de base para la elaboración de la SRA Europea y puesta en común entre las naciones para identificar sinergias en necesidades de I+D y posibles mecanismos de financiación.

Plan de trabajo en el primer año de INSPIRATION



Ejemplos de preguntas:

Necesidades de I+D

- Cuáles son los retos sociales que consideréis como importantes?
- Empezando por vuestra propia experiencia: cuales son los temas (necesidades de I+D) que deberían estar incluidos en la SRA?

Experiencias relacionadas con conectar ciencia y política/práctica:

- Cómo definiría usted “conocimiento científico”?
- Según usted, en qué medida la formulación de políticas se basa en los resultados y el estado del arte de la ciencia en nuestro pais?

Esquemas de financiación nacionales y transnacionales

- Vuestra organización financia I+D? (no internamente, pero a terceros)
- Qué experiencias y expectativas tenéis en términos de esquemas de financiación (publicos / privados) en vuestro campo de expertise que podrían ofrecer oportunidades para una futura investigación en los temas de uso y gestión del suelo y el sistema suelos-sedimentos-agua.

Vuestros beneficios en participar en el proyecto:

- Una oportunidad para influir en la SRA Europea sobre la gestión del territorio y del sistema suelo-sedimento-agua en relación con las necesidades y los retos de la sociedad
- Una información directa sobre los avances y resultados del Proyecto para su valorización: visión global sobre las necesidades de I+D así que sobre mecanismos de financiación existentes y futuros en diferentes niveles (i.e. sub-nacional, nacional, europeo e internacional); conocimiento sobre mejores prácticas y oportunidades de vinculación entre ciencias y políticas/practica/mercado
- Aprovechar la dimensión internacional del proyecto para entrar en contacto con otras redes y organizaciones e identificar retos comunes para compartir esfuerzos y crear alianzas.

Contactos e información:

Para información general del proyecto INSPIRATION consulte la pagina web:
www.inspiration-h2020.eu

Contacto del Punto Focal Nacional	Contacto del coordinador de proyecto:
TECNALIA Parque Tecnológico de Bizkaia c/ Geldo, edificio 700 E-48160 Derio Bizkaia *Pierre Menger* pierre.menger@tecnalia.com *Gemma Garcia Blanco* gemma.garcia@tecnalia.com *Efrén Feliu* efren.feliu@tecnalia.com	*Stephan Bartke* FG I3.5 – Coordination INSPIRATION Federal Environment Agency Woerlitzer Platz 1 06844 Dessau-Rosslau Germany stephan.bartke@uba.de

Annex II: Documents used for the Spanish desk study

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Planetary boundaries: Guiding human development on a changing planet Will Steffen et al. 2015. Science Express. http://www.sciencemag.org/content/early/recent

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Annex III:R&I Funding programs

International and European programs

	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
1	**ERANET M-ERA.NET**	Network of 36 public funding organisations from 25 European countries: https://www.m-era.net/partners	M-ERA.NET is an EU funded network which has been established to support and increase the coordination of European research programmes and related funding in materials science and engineering.	https://www.m-era.net/
2	**ERANET EUROTRANSBIO**	EuroTransBio consists of organizations from 13 European countries and regions: https://www.eurotransbio.eu/index.php?index=9	EuroTransBio (ETB) is an international funding initiative supported by European program owners. It has established itself as the preferred funding instrument for small and medium sized enterprises (SMEs), collaborating in the area of modern biotechnology.	https://www.eurotransbio.eu/
3	**BIODIVERSA ERA-Net**	19 European Union Member States & 32 partner organisations http://www.biodiversa.org/11	The European partners in the BiodivERsA/FACCE-JPI network have joined efforts to organize and fund a pan-European call for research projects on" promoting synergies and reducing trade-offs between food supply, biodiversity and ecosystem services".	http://www.biodiversa.org/
4	**JPI Climate**	16 Member Countries http://www.jpi-climate.eu/programme/membercountries	JPI Climate members are countries – EU members or associated states – that have formally declared their commitment and willingness to actively contribute to JPI operations (with their work force, financial resources, and existing research and innovation investments, etc.) by signing a Letter of Intent.	http://www.jpi-climate.eu/home

5	**FACCE JPI (Agriculture, Food Security and Climate Change)**	21 countries	The Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI) brings together 21 countries who are committed to building an integrated European Research Area addressing the interconnected challenges of sustainable agriculture, food security and impacts of climate change. FACCE-JPI provides and steers research to support sustainable agricultural production and economic growth, to contribute to a European bio-based economy, while maintaining and restoring ecosystem services under current and future climate change.	http://www.faccejpi.com/
6	**ERA-NET Cofund WaterWorks**	20 partner countries & 4 observer countries	The ERA-NET Cofund initiative WaterWorks2015, a collaboration of Water JPI and FACCE JPI, will set up a programme on sustainable water use in agriculture to increase water use efficiency and reduce soil and water pollution. This theme is common to the Str	http://www.waterjpi.eu/
7	**ERANET BESTF2**	The principal objective of the BESTF call is to fund public-private projects that de-risk bioenergy technologies at demonstration scale and to encourage further private exploitation.	The entities eligible for CDTI's funding are companies established and carrying out R&D activities in Spain. Universities and Research Institutions can participate as subcontractors of Spanish companies. Eligible expenditure in R&D projects: Personnel, Instrument and Material, Contractual research, Technical knowledge and Patents consulting and	http://eranetbestf.net/

			equivalent services intended exclusively for the research activity. Other operating expenses derived from the research project. Length of the project: The length of these projects may be from 12 to 36 months.	
8	**H2020**	European Commission	Horizon 2020 is the new EU funding programme for research and innovation running from 2014 to 2020 with a €80 billion budget.	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/master_calls.html
9	**LIFE+ The LIFE (the Financial Instrument for the Environment and Climate Action)**	Directorate General for the Environment, European Commission	LIFE is the EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU.	http://ec.europa.eu/environment/life/about/index.htm#life2014
10	**Climate-KIC**	European Institute of Innovation and Technology (EIT)	Climate-KIC is a world-class network focused on meeting the global challenge of climate change. Our core purpose is to create opportunities for innovators to shape the world's next economy. We create new partnerships to integrate research, business and technology to transform innovative ideas into new products, services and jobs.	http://www.climate-kic.org/

11	**The Research Programme of the Research Fund for Coal and Steel (RFCS)**	The programme is managed by the European Commission, Directorate-General for Research and Innovation (Directorate D – Key Enabling Technologies)	Steel and coal remain key areas for the continuous sustainable economic development of Europe and the RFCS programme is fully in line with the scientific, technological and political objectives of the European Union. This includes the general aim of contributing to sustainable development, clean and safe production, protection of the environment, conservation of resources, health and safety aspects as well as improvement of working conditions.	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/rfcs/calls/rfcs-2015.html
12	**COST Actions**	COST is an intergovernmental framework consisting in 36 Member Countries and a Cooperating State: http://www.cost.eu/about_cost/cost_countries	COST funds pan-European, bottom-up networks of scientists and researchers across all science and technology fields. These networks, called 'COST Actions', promote international coordination of nationally-funded research.	http://www.cost.eu/
13	**Interreg EUROPE (antes Interreg IVC)**	30 countries, 28 EU Member States, Switzerland and Norway	INTERREG IVC programme (2008-2013) will continue as Interreg Europe. Discover what the new programme offers for European regions on Research & innovation, Competitiveness of SMEs, Low-carbon economy and Environment & resource efficiency.	http://www.interregeurope.eu/

14	**Interreg Med Programme 2014-2020**	57 regions divided among 10 EU Member States and 3 IPA countries. http://interreg-med.eu/en/cooperation-area/	The main objective of the Interreg MED Programme is to promote sustainable growth in the Mediterranean area by fostering innovative concepts and practices and a reasonable use of resources and by supporting social integration through an integrated and territorially based cooperation approach.	http://interreg-med.eu/en/med-working-fields/
15	**Interreg POCTEFA 2014-2020**	L'autorité de gestion du programme est la Communauté de Travail des Pyrénées (CTP); un consortium de huit territoires: Aquitaine, Midi-Pyrénées, Languedoc-Roussillon, Euskadi, Navarre, Aragon, Catalogne et d'Andorre. INTERREG VA ESPAGNE-FRANCE-Andorre (POCTEFA 2014-2020), est un programme de coopération transfrontalière européenne visant à promouvoir le développement durable de la zone frontalière entre les trois pays	Le budget alloué au POCTEFA 2014-2020 s'élève à 189,3 millions d'euros provenant du Fonds Européen de Développement Régional (FEDER). De cette somme, 177 980 913 millions d'euros seront alloués au développement de projets transfrontaliers. Le budget restant est employé afin de couvrir les dépenses de l'assistance technique du Programme. Quels types de dépenses sont éligibles? En général, voici les catégories de dépenses : frais de personnel, frais de bureau et frais d'administration, frais de déplacement et d'hébergement, frais liés à expertise et services externes, dépenses d'équipements, d'infrastructures et dépenses de préparation.	http://www.poctefa.eu/fr/programme/axes-priorites/

16	**Interreg SUDOE 2014-2020**	Le Programme Interreg Sudoe soutient le développement régional dans le sud-ouest de l'Europe en finançant des projets transnationaux par le biais du Fond Européen de Développement Régional (FEDER).	Les projets approuvés doivent être organisés par des partenaires publics ou privés de régions de différents pays du sud-ouest européen. Les régions éligibles sont toutes les Communautés autonomes espagnoles (sauf les Iles Canaries), les six régions du sud-ouest de la France, les régions continentales du Portugal, le Royaume-Uni (Gibraltar) et la Principauté de l'Andorre.	http://www.interreg-sudoe.eu/proyectos/primera-convocatoria
17	**EUREKA EUROSTARS**	Eurostars is a joint programme between EUREKA and the European Commission, co-funded from the national budgets of 34 Eurostars Participating States and Partner Countries and by the European Union through Horizon 2020.	Eurostars applies a decentralised funding procedure; participants do not receive funding directly from the EUREKA Secretariat or the EU.	https://www.eurostars-eureka.eu/

18	**EUREKA EUROGIA 2020, the EUREKA low-carbon energy technology cluster**	EUROGIA2020 is a cluster of the EUREKA network, a decentralized intergovernmental initiative started in 1985 to enhance European competitiveness by supporting businesses, research centers and universities that take part in trans-national projects. EUROGIA2020 is the EUREKA Cluster for low carbon energy technologies. It covers the entire energy value chain from all forms of primary energy sources through transportation and distribution. It also includes transverse technologies such as materials, IT or manufacturing technologies that support the energy system.	EUREKA unites 40 member countries and also counts the European Union as its 41st member. Together, they promote international, market-oriented research and innovation through the support they offer to small and medium-sized enterprises, large industry, universities and research institutes. Through EUREKA, these organizations are introducing new products, processes and services to market, helping make Europe economically strong and socially sound.	www.eurogia.com
19	**EUREKA ACQUEAU**	ACQUEAU is one of the 7 clusters of the EUREKA network. We are	ACQUEAU Open Call supports projects with the potential of developing breakthrough innovations in the water sector.	http://www.acqueau.eu/

		a market and industry driven initiative, joined by more than 26 countries and 100 companies across Europe and beyond. Our goal is to promote transnational collaboration for developing innovative projects in water technologies.	ACQUEAU Open Call supports projects in water sector twice per year (Autumn session and Spring Session)	

National programs

Nº	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
1	Programa INNFLUYE	Ministry of Economy and Competitiveness	Aid to Technology Platforms on Dissemination actions; Forums to share information or work; Actions aimed at promoting cooperation between institutions for the development of projects; Actions of dissemination and analysis. Participants: Technology PLatforms	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=51f713074cca5410VgnVCM1000001d04140aRCRD
2	Subprograma Torres Quevedo.	Ministry of Economy and Competitiveness	Recruitment of research personnel. Participants:SMEs, Research Centers, Public Bodies	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=3b85d6a0840b1510VgnVCM1000001d04140aRCRD
3	Programa INNCORPORA_Titulados Universitarios	Ministry of Economy and Competitiveness	Aid for the recruitment and training of technologists University Graduates. Participants: SMEs, Research Centers, SMEs Business Associations	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=c85df068a1bbf210VgnVCM1000001d04140aRCRD
4	Subprograma NEOTEC	CDTI (Center for Industrial Technology Development)	Support for the creation and consolidation of new technology-based companies in Spain. Participants: EIBTs	https://www.cdti.es/index.asp?MP=7&MS=651&MN=3
5	Research challenges - Retos de Investigación	Ministry of Economy and Competitiveness	Basic Research. Participants: Research Centers, Public Bodies, Universities, Non profit organisations	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=437732ee7af1e410VgnVCM1000001d04140aRCRD&vgnextchannel=33f85656ecfee310Vgn

				VCM1000001d04140aRCRD
6	Subprograma de Personal Técnico de Apoyo	Ministry of Economy and Competitiveness	Recruitment of Technical Support Staff. Participants: Research Centers, Public Bodies, Universities, Non profit organisations	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=5033d9ac3f761510VgnVCM1000001d04140aRCRD
7	Subprograma Juan de la Cierva	Ministry of Economy and Competitiveness	Recruitments of junior PHD. Participants:Research Centers, Public Bodies, Universities, Non profit organisations	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=a7fd498e15861510VgnVCM1000001d04140aRCRD
8	Subprograma Ramón y Cajal	Ministry of Economy and Competitiveness	Recruitments of senior PHD. Participants: Research Centers, Public Bodies, Universities, Non profit organisations	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=68f8d9ac3f761510VgnVCM1000001d04140aRCRD
9	INNVIERTE	CDTI (Center for Industrial Technology Development)	Venture capital for startups.Participants: EIBTs, SMEs	https://www.cdti.es/index.asp?MP=7&MS=656&MN=4
10	Biodiversity foundation	Biodiversity foundation	Development of activities in the field of terrestrial biodiversity, marine and coastal biodiversity, climate change and environmental quality. Participants: companies, public bodies and non profit organisations	http://fundacion-biodiversidad.es/sites/default/files/multimedia/archivos/convocatorias_ayudas_2015_0.pdf
11	Grants for projects of scientific research in the National Parks Network. -	Ministry of Agriculture, Food and Environment.	Grants for projects of scientific research in the National Parks Network. Participants: Public universities, public research bodies, research centers	http://www.magrama.gob.es/es/parques-nacionales-oapn/programa-investigacion/

	Proyectos de investigación científica en la Red de Parques Nacionales			
12	Collaboration challenges - RETOS COLABORACIÓN	Ministry of Economy and Competitiveness	Collaborative R&D&i projects, sharing risks and results. Participants: Companies, public research organizations, public and private universities, research, other public and private R + D + i and business associations	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=6030ce7e72a32510VgnVCM1000001d04140aRCRD
13	Research challenges - RETOS INVESTIGACIÓN	Ministry of Economy and Competitiveness	Collaborative R&D&i projects more focused on basic research. Participants: public or private non-profit organisations	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=437732ee7af1e410VgnVCM1000001d04140aRCRD&vgnextchannel=33f85656ecfee310VgnVCM1000001d04140aRCRD
14	R&I projects of INIA - INIA PROYECTOS DE I+D+I	National Institute for Agricultural Research and Experimentation (INIA)	INIA R&D&i projects. Participants: Researchers in the public R + D + i of agricultural or food research dependent on Regions and/or INIA	http://www.inia.es/IniaPortal/goUrlDinamica.action?url=http://wwwsp.inia.es/IDi/ProgramasInia
15	Grants for projects financed by CDTI (Center for Industrial Technology Developm	CDTI (Center for Industrial Technology Development)	Grants for projects financed by CDTI (Center for Industrial Technology Development). Participants: companies	http://www.cdti.es/index.asp?MP=7&MS=20&MN=3&r=1600*900

	ent) - Subvenciones para proyectos financiados por CDTI.			
16	Strategic projects CIEN - Proyectos Estratégicos CIEN	CDTI (Center for Industrial Technology Development)	Grants for strategic projects financed by CDTI (Center for Industrial Technology Development). Participants: companies	http://www.cdti.es/index.asp?MP=7&MS=766&MN=4
17	Programa _FEDER-INNTERCONECTA	CDTI (Center for Industrial Technology Development)	Grants to promote public-private stable cooperation in research and development (R & D). Participants: companies	http://www.cdti.es/index.asp?MP=7&MS=577&MN=3
18	Proyectos "Explora Ciencia" y "Explora Tecnología"	Ministry of Economy and Competitiveness	Basic Research (limit of knowledg frontiers). Participants: public or private non-profit organisations	http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=fe0db3320c687410VgnVCM1000001d04140aRCRD

Regional programs

Nº	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
1	Incentive program for the promotion of Innovation and entrepreneurial development - Programa de Incentivos para el Fomento de la Innovación y el Desarrollo Empresarial	Junta de Andalucía	EIBT creation and R & D colaborative projects. Participants: SMEs	http://www.agenciaidea.es/programa-innovacion-y-desarrollo-empresarial
2	Program of incentives for the sustainable development of energy - Programa de incentivos para el desarrollo energético sostenible	Junta de Andalucía	R&D projects on energy efficiency, energy recovery facilities, energy studies and dissemination and improved energy infrastructure. Participants: Companies	http://www.juntadeandalucia.es/servicios/ayudas/detalle/76819.html
3	Program if incentives for the promotion of innovation and entrepreneurial development- Programa de Incentivos para el Fomento de la Innovación y el Desarrollo Empresarial	Junta de Andalucía	Research, development and innovation projects. Participants: SMEs	http://www.agenciaidea.es/ayudas
4	IDEA	Junta de Andalucía	Setting up of EBTs. Participants: EIBTs, universities	http://www.agenciaidea.es/programa-innovacion-y-desarrollo-empresarial

5	Grants in the frame of Innovation Strategy - Subvenciones en el marco de la Estrategia de Innovación	Gobierno de Aragón	a) R&D&i projects b) Mobility of researchers c) Cooperative innovation projects of a cluster or business association and interclusters or business interassociations. Participants: Companies, clusters, business associations	http://www.ayudaempresarial.es/archivos/1319191211.pdf
6	Aid for the execution of R&I projects - Ayudas para la ejecución de proyectos de I+D+i	Principado de Asturias	R&D&i projects. Participants: Companies	http://www.idepa.es/sites/web/idepaweb/servicios/ayudas/buscador/ficha.jsp?resource=/system/idepa/contents/ayudas/ayuda1174404159103.xml
7	Aids for the creation and development of innovative buisinesses with technological basis - Ayudas para la creación y desarrollo de empresas innovadoras de base tecnológica	Principado de Asturias	Support for the creation and development of innovative technology-based companies. Participants: EIBTs	http://www.idepa.es/sites/web/idepaweb/servicios/ayudas/buscador/ficha.jsp?resource=/system/idepa/contents/ayudas/ayuda1174465213572.xml
8	Grants for innovative projects in the frame of INNOVA-IDEPA program - Subvenciones para proyectos innovadores, dentro del programa INNOVA-IDEPA	Principado de Asturias	Innovative projects. Participants. Companies	http://www.idepa.es/sites/web/idepaweb/servicios/ayudas/buscador/ficha.jsp?resource=/system/idepa/contents/ayudas/ayuda1175245547650.html
9	Programa Asturias	Principado de Asturias	Aid for technological centers and support centers for technological innovation. Participants: Research Centers	https://sedemovil.asturias.es/portal/site/Asturias/menuitem.46a76b28f520ecaaf18e90dbbb30a0a0/?vgnextoid=ef4483cb035d8210VgnVCM10

				000097030a0aRCRD&i18n.http.lang=es
10	Programa INNOEMPRESA	Cabildo de Canarias	R&D&i projects. Participants: SMEs	http://www.gobiernodecanarias.org/boc/2013/056/009.html
11	INNOVA grants - Subvenciones INNOVA	Gobierno de Cantabria	R&D&i projects. Participants: Companies	http://www.cantabria.es/i-d-i
12	Plan Adelanta	Comunidad de Castilla León	Investment and business creation program. Participants: SMEs	https://www.tramitacastillayleon.jcyl.es/web/jcyl/AdministracionElectronica/es/Plantilla100Detalle/1251181054765/_/1284157420848/Propuesta
13	Plan Adelanta	Comunidad de Castilla León	R&D&i projects. Participants: Companies	https://www.tramitacastillayleon.jcyl.es/web/jcyl/AdministracionElectronica/es/Plantilla100Detalle/1251181054765/_/1284157420848/Propuesta
14	Ayudas reembolsables destinadas a financiar Proyectos de Inversión, I+D+i y las necesidades de capital circulante.	Comunidad de Castilla León	Refundable aid to finance investment projects, I + D + i and working capital requirements. Participants: SMEs	http://www.ayudas.net/Ayudas_financiar_inversiones_empresariales_gastos-13150BT1ERP15O1PQ.htm
15	Refundable aid to finance investment projects, I + D + i and working capital requirements. Participants: SMEs - Ayudas reembolsables para proyectos de inversión, y de I+D+i.	Comunidad de Castilla León	Refundable aid for investment projects, and R & D + i. Participants: companies	http://www.ayudas.net/Castilla_Leon_pone_marcha_ayudas-10756NportadaT1P.htm

16	Promotion of R&I in the agro-food sector - Fomento de I+D+i en el sector agrario y alimentario	Generalitat de Catalunya	Aid to promote the approach and the drafting of research, development and innovation (R + D + I) for the development of new technologies, products and processes in agriculture and food. Participants: agricultural, forestry and food companies	http://pae.gencat.cat/es/noticies/8061_ovt_ajuts-projectes-rdi-sector-agrari-alimentari_
17	Grants for innovative projects for the development of new technologies, products and processes from the climate-change and support renewable energy, water management and biodiversity. Participants: agricultural, forestry and food companies - Ayudas para proyectos innovadores para el desarrollo de nuevas tecnologías	Generalitat de Catalunya	Grants for innovative projects for the development of new technologies, products and processes from the climate change and support renewable energy, water management and biodiversity. Participants: agricultural, forestry and food companies	http://pae.gencat.cat/es/noticies/9387_ovt_ajuts-projectes-pilot-innovadors-noves-tecnologies-productes-processos_
18	Entrepreneurship plan - Plan de emprendimiento	Generalitat Valenciana	Program to support the growth of innovative start-ups. Participants: SMEs, EIBTs	http://www.impiva.es/index.php?option=com_remository&Itemid=124&func=select&id=220&lang=es
19	Entrepreneurship plan - Plan de emprendimiento	Generalitat Valenciana	Creation of technology based companies. Participants: EIBTs	http://www.impiva.es/index.php?option=com_remository&Itemid=124&func=select&id=220&lang=es
20	Business R&I plan - Plan de I+D Empresarial	Generalitat Valenciana	Research and Technological Development for SMEs. Participants: SMEs	http://www.impiva.es/index.php?option=com_remository&Itemid=100124&func=select&i

				d=221&lang=es
21	Business R&I plan - Plan de I+D Empresarial	Generalitat Valenciana	R & D Colaborative projects. Participants: companies	http://www.impiva.es/index.php?option=com_remository&Itemid=100124&func=select&id=221&lang=es
22	Aids for business activities in R&I - Ayudas a la actividad empresarial en I+D+i	Gobierno de Extremadura	Industrial research and / or experimental development and technological innovation. Participants: companies	http://cicytex.gobex.es/es/convocatorias/2/fomento-de-la-actividad-empresarial-en-i-d-i-ayudas-para-el-fomento-de-investigacion-desarrollo-tecnologico-e-innovacion-en-actividad-emprendedora-y-empresarial-de-las-pequenas-medianas-y-grandes-empresas
23	Ayudas para investigación, desarrollo tecnológico y la innovación de las Pymes y grandes empresas	Gobierno de Extremadura	Technological innovation projects. Industrial research and / or experimental development projects. Participation in national and / or Community calls, in industrial research, experimental development and innovation. Creation and consolidation of R & D units in companies. young innovative technology companies. Participants: SMEs	http://ayudaspri.gobex.es/portal/ayudas
24	Programa INNOEMPRESA	Xunta de Galicia	R&D&i projects. Participants: SMEs	http://gain.xunta.es/artigos/388/programa+innoempresa+igape+gain

25	Development of R&I projects (aids for EU project preparation) - Realización de proyectos de investigación y desarrollo, I+D (Actuación 1)	Gobierno de La Rioja	R&D&i projects. Participants: Companies	http://www.ader.es/ayudas/ayudas-por-areas/i-d/idd-realizacion-de-proyectos-de-investigacion-y-desarrollo-i-d/
26	Programa Innoempresa	Comunidad de Madrid	Innovation Support for SMEs. Participants: SMEs	http://www.madrid.org/cs/Satellite?buscador=true&c=CM_ConvocaPrestac_FA&cid=1142536944768&language=es&pagename=ComunidadMadrid%2FEstructura
27	Aids for R&I projects Ayudas para proyectos de I+D+i	Gobierno de Navarra	Incentives to increase research and development. Participants: SMEs, research Centers, Public bodies	http://www.navarra.es/home_es/servicios/ficha/5559/Ayudas-a-empresas-para-realizar-proyectos-de-I-D-2015
28	Development of actoin plans for landscape - Elaboración de Planes de acción del paisaje	Gobierno Vasco	Developing action plans landscape. Participants: public bodies	http://www.ingurumena.ejgv.euskadi.eus/bopv2/datos/2015/07/1503285a.pdf
29	Knowledge generation for the conservation of Natural Heritage - Generación de conocimiento en la conservación del Patrimonio Natural	Gobierno Vasco	Generation of knowledge in the conservation of Natural Heritage: Participants: Non profit organisations, Foundations, companies	http://www.euskadi.eus/gobierno-vasco/-/ayuda_subvencion/2014/generacion_conocimiento/
30	ELKARTEK, formerly ETORTEK	Gobierno Vasco	Strategic R & D projects. Participants: non profit organisations registered in Basque network of R&D, foundations, companies	http://www.spri.eus/euskadinnova/es/portada-euskadiinnova/ayudas/ayudas-destinadas-

				investigacion-colaborativa-areas-estrategicas-elkartek-2015/20150649.aspx
31	Programa IKERKETA	Gobierno Vasco	Aid for research, development and technological innovation in agriculture, fisheries and food sectors. Participants: companies	http://www.euskadi.eus/gobierno-vasco/contenidos/ayuda_subvencion/3813/es_4657/3813.html
32	Programa HAZITEK	Gobierno Vasco	Support Programme for R & D Companies. Participants: companies	http://www.euskadi.eus/gobierno-vasco/-/ayuda_subvencion/2015/programa-de-apoyo-a-la-i+d-empresarial-hazitek-2016/

Annex IV: National workshop agenda and participants

Day 1 – January 26th, 2016 – 14:00 – 18:00

Time	Activity	Moderator
13.00	Catering	
14.00	Welcome and presentation of workshop objectives	TECNALIA – Efrén Feliu
14.10	Participants roundtable	
14.25	INSPIRATION: (re)introduction to the Project	TECNALIA – Pierre Menger
14.40	Synthetic presentation of interview results	TECNALIA – Pierre Menger – Gemma Garcia
15.00	Identification of R&I needs	
	Setting the context of R&I needs • Consider the challenge • Key issues, drivers, barriers, pressures • Defining the problem/gap→ • Identification of benefits (impacts)	Participants 20´for appointing ideas on post-its individually. Debate between participantes – identificación de sinergias, identificación de beneficios
16.00	Café	
16.30	Identification of R&I needs	
	Setting the context of R&I needs (continue) --- Starting setting priorities - clustering	30´Debate - --- 60´ - prioritization - clustering
18.00	End of day	

Day 2 – January 27th, 2016 – 9:00 – 14:00

Time	Activity	Moderator
09.00	Introduction– Objectives of the workshop	TECNALIA – Pierre Menger
09.10	Finalizing debate on priority setting and clustering	TECNALIA –– Efrén Feliu – Gemma Garcia, Pierre Menger
10.15	Roadmap for realizing the R&I agenda 2 themes: • **Science-policy Interface** ○ Identifying barriers for implementing and realizing R&I agenda	TECNALIA – Efren Feliu
11.15	café	30´

11.45	• **Financing**
	  ○ Identification of bottlenecks and needs
	  ○ How to improve added value of R&I investments
	  ○ Alternative governance systems for funding R&I
		TECNALA – Efren Feliu

12.45	Elevator pitch for all participants – key message	
13.30	Conclusions and next project milestones	TECNALIA – Pierre Menger
13.45	Workshop closure	
	CATERING	

Workshop Participants:

1. Spanish Office for Climate Change - OECC
2. University of Valencia – Department of Geography
3. CSIC – Zaragoza – Spanish National Research Council
4. CSIC – Sevilla – Spanish National Research Council
5. MAGRAMA Ministry of Agriculture and Environment
6. SPRILUR – Regional Industrial Parks Development Agency
7. OCT – Observatory of Territorial Culture
8. FUNDICOT – Interprofessional Association of Land use Planning
9. Independent consultant – Formerly Professor at University of Madrid (Environment and Land use planning)
10. Navarra Territorial Observatory
11. IHOBE – Basque Environment Agency

Annex V: Eg. Complete list of societal challenges and related questions as mentioned in the interviews

- Contribute to food security and food safety;
- Ensure secure supplies of safe drinking water;
- Secure energy supply and distribution;
- Reduce raw material and resource consumption,
- Ensure efficient use of natural resources;
- Contribute to climate change mitigation and societal adaptation. (It is commented the major potentials of RTD developments are in the field of adaptation rather than mitigation).
- Contribute to a healthy living environment;
- Sustainable spatial planning,
- Sustainable management of ecosystems
- Soil as a resource must be protected and its conservation promoted. soil is the forgotten part of natural sciences. society is lacking awareness about its importance

15. Sweden

Report by Yvonne Ohlsson, Lisa van Well, Kerstin Konitzer

15.1 Executive summary

15.1.1 English version

Land, land use, and land use changes, and their relationship to soil, water and sediment systems are linked to a number of societal challenges. Research and innovation are needed in order to tackle these challenges. Research issues should originate in societal needs, which is why it is important that society's various stakeholders participate in the formulation research questions. In addition, the research results need to be implemented in society in order to have an impact. A close collaboration between researchers and stakeholders is therefore necessary.

A total of 18 Swedish stakeholders, identified as the "National Key Stakeholders", NKS, (researchers, research funders and current or potential users) have helped to identify and prioritize important societal challenges and research issues for Sweden. They have also provided comments on the financing arrangements that are appropriate and effective, and how the science-policy interface and research-implementation are best secured. The present report is based on interviews with NKS, discussions at a workshop (14 January 2016 in Stockholm) and supporting documentation recommended by the NKS. A number of people (in addition to the 18 NKS) have also contributed with literature suggestions and comments.

A list of those who have contributed is provided in Appendix Ia.

The major societal challenges that are highlighted in this report are largely related to attaining a sustainable, healthy and secure living environment. A chemically and microbiologically safe environment relates strongly to food production and drinking water. The sustainability aspect is also highly related to sustainable production and consumption of food and other products, as well as to the challenges of sustainable construction in the face of rapid urbanisation. Climate change and adaptation to a changing climate is an important challenge in itself, but also integrated into most of the other challenges.

In addition, a number of research themes, including important research topics, have been compiled and linked to these societal challenges. Current themes include "Climate change effects on surface and ground water and ground conditions (mitigation and adaptation)", "Safe and sustainable (drinking) water supply from water source to tap", "Ensuring efficient use of natural resources", "How to reach sustainable urbanisation", "Sustainable agriculture and food production", "Sustainable forestry", "Management of Contaminated land, groundwater and sediments", "Biodiversity and ecosystem services" and "Communication and implementation : Societal reach and impact ".

In order to tackle these social challenges research agendas should emphasise targeted, and preferably multistage, calls based on societal reach and communication as appropriate and important tools to ensure societal relevance. Moreover, the calls or programmes should promote collaboration between universities, colleges and institutions, but also between researchers and various societal stakeholders (government, industry, small and medium-sized enterprises (SMEs), industry associations, etc.). Collaboration should occur at an early stage in the project life so that all parties feel an ownership in the research question and to

ensure that it addresses societal needs. This helps to provide more focused applications with a higher outcome for those who invest time, commitment and resources in writing applications and building consortia. Further important components are longer project duration (> 3 years) and longer term programmes (e.g. 10 years). Effective communication and implementation were also seen as essential. The latter should be given great weight in evaluations of research applications.

Measuring the social impacts of research is difficult and it may take some time before effects are seen in society. There few actors who have systematically worked on this, but the interest is present and there is a need for more support, method development and guidance. Providing “measurements” and indicators of societal relevance in various research projects, assessments and programmes is increasingly in demand by many stakeholders. In the report, various types of indicators to assess social impact are compiled. Examples are the number of/average number of relevant stakeholders involved in R&I projects and how they are involved, number or percentage of F&I project (in a portfolio), the results of which can be directly implemented in consulting/policy/other implementation processes and how the implementation occurs, number or percentage of R&I projects where relevant institutions and professional resources for communication and implementation are linked. Different indicators may be relevant for different various stakeholders.

In Sweden there are many ongoing efforts for addressing societal challenges in various and research areas and research and innovation agendas. These efforts involve actors from several sectors and administrative levels. Swedish financiers are working diligently to find ways to substantially increase the impacts and benefits of research to society. Targeted calls for proposals are becoming more frequent. Even within PhD studies there is often a focus on the importance of collaboration with societal actors. Input into the government’s research and innovation bill for the coming 10 years (2017-2027) underscores the challenges of society and the societal relevance aspects that research funding bodies, industrial representatives, national authorities and research institutions need to deal with.

15.1.2 Swedish version

Mark, markplanering och markanvändning och deras relation till jord-, vatten- och sedimentsystemet är kopplat till ett flertal samhällsutmaningar. För att ta oss an utmaningarna behövs forskning och innovation. Forskningsfrågorna behöver ha ett ursprung i samhällets behov, varför samhällets olika intressenter behöver medverka i att formulera forskningsfrågorna. Vidare behöver resultaten implementeras i samhället för att ge effekt. En nära samverkan mellan forskare och intressenter är nödvändig.

Totalt 18 svenska forskningsintressenter, s.k. ”National Key Stakeholders”, NKS, (forskare, forskningsfinansiärer och förväntade användare, eller behovsägare) har bidragit till att identifiera och prioritera för Sverige viktiga samhällutmaningar och forskningsfrågor. De har också gett synpunkter på vilka finansieringssätt som är lämpliga och effektiva, samt hur övergången forskning–policy respektive forskning-implementering bäst säkerställs. Föreliggande rapport baseras på intervjuer av NKS, diskussioner vid en workshop och underlag som rekommenderats av NKS. Ytterligare ett antal personer (utöver de 18 NKS) har också bidragit med underlag och synpunkter. I rapporten finns en lista (Appendix Ia) med de som bidragit.

Viktiga samhällsutmaningar som lyfts fram är i hög grad relaterade till en hållbar, hälsosam och säker livsmiljö. Den kemiskt och mikrobiologiskt säkra miljön relaterar starkt till *livsmedel* och *dricksvatten*. Hållbarhetsaspekten knyter i hög grad an till *hållbar produktion och konsumtion* av såväl livsmedel som andra varor, men också till en *hållbar byggsektor* och en *snabb urbanisering*. *Klimatförändringar* och anpassning till ett förändrat klimat är en given utmaning dels i sig själv, men också som en del i andra utmaningar.

Vidare har ett antal forskningsteman, inklusive viktiga forskningsfrågor, sammanställts vilka också är kopplade till samhällsutmaningarna. Aktuella teman är “Climate change effects on surface and ground water and ground conditions (mitigation and adaptation)”, ”Safe and sustainable (drinking) water supply from water source to tap”, “Ensuring efficient use of natural resources”, “How to reach sustainable urbanization”, “Sustainable agriculture and food production”, “Sustainable forestry”, “Management of Contaminated land, groundwater and sediments”, “Biodiversity and ecosystem services” and “Communication and implementation: Societal reach and impact”.

För ta sig an samhällsutmaningarna framhålls riktade, gärna flerstegs-, utlysningar med utgångspunkt i samhällsutmaningar som lämpliga och viktiga instrument. Vidare bör utlysningarna eller programmen gynna samverkan mellan universitet, högskola och institut men också mellan forskare och samhällsaktörer (myndigheter, industri, små och medelstora företag, branschorganisationer etc.). Samverkan behöver komma in tidigt så att alla parter känner ett ägarskap i forskningsfrågan och ett samhällsbehov. Det ger mer genomarbetade, fokuserade ansökningar och ett högre utfall för de som investerar tid, engagemang och medel i att skriva ansökningar och att bygga konsortier. Ytterligare viktiga komponenter är långa projekttider (>3 år) och långsiktiga program (10 år). Det är också avgörande för en effektiv kommunikation och implementering. Det senare bör ges stor tyngd i utvärderingar av forskningsansökningar.

Att mäta samhällsnytta av forskning är svårt och det kan ta tid innan effekter syns i samhället. Det är få aktörer som systematiskt har arbetat med detta, men intresset finns och det finns ett behov av stöd, metoder och vägledning. Redovisning av samhällsnytta efterfrågas alltmer från olika aktörers verksamheter. Det finns exempel på indikatorer på samhällsnytta som kan användas. I rapporten har olika typer av indikatorer sammanställts. Exempel är antal/medelantalrelevanta stakeholders involverade i FoI-projekt samt hur de är involverade, antal eller andel FoI-projekt (i en portfölj) vars resultat direkt kan implementeras i konsultverksamhet/policy/annan implementeringsväg och hur det implementeras, antal eller andel FoI-projekt där institut för in relevanta och professionella resurser för kommunikation och implementering. Olika indikatorer kan vara relevanta för olika aktörer.

I Sverige pågår stora satsningar kring samhällsutmaningar inom många områden och ett stort antal agendor har utarbetats. Många branschaktörer deltar idag i såväl forskningsprojekt som i utarbetande av agendor. Finansiärerna arbetar medvetet för att hitta former där samhällsnyttan får genomslag. Riktade utlysningar genomförs i allt högre grad. Även i doktorandutbildningar finns idag ofta ett fokus på vikten av samverkan med samhällsaktörer. I inspel till Regeringens forskningsproposition och innovationsproposition för den kommande 10-årsperioden (2017-2027) framhålls samhällsutmaningarna och samhällsnyttoaspekterna av såväl forskningsfinansiärer som bransch- och myndighetsrepresentanter och forskarföreträdare.

15.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for Sweden. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation”. In Sweden, 18 national key stakeholders, NKS, have been interviewed. Details on these NKS are provided in Annex Ia and the interview questions are provided in Annex Ib. A stakeholder workshop was held in Stockholm Jan 14, 2016, in which the results from interviews and a desk top study was presented and further discussed and reviewed. The workshop agenda and participant list is provided in Annex VI. This national report constitutes a synthesis of stakeholder interviews, the desk top study and the result from the workshop. The desk study was based on documents as suggested by NKS and by a literature survey performed. These are listed in Annex II.

At the workshop, there were in-depth thematic discussions in groups and plenum in order to reach consensus, prioritise when relevant and make a synthesis regarding the questions discussed. At a first stage all workshop participants were given an opportunity to discuss and provide input to each of the three topics (Strategic R&I-agenda, Science-policy interface and funding opportunities). Thereafter the participants were split into three groups that worked specifically on one topic each towards final recommendations to the Swedish report from each group. The group results and recommendations were also presented and discussed in plenum at the end of the workshop.

After the workshop the results were included in the present report and all NKS, also those not attending the workshop, were invited to review the results after the workshop. Also other contributors, some present at the workshop and some not, were given the opportunity to review the report. Overall, 12 stakeholders (funders, researchers and end-users) gave feedback on the report. Some stakeholders chose to give specific review comments to some parts of the reports while others gave specific and/or more general comments on the whole final report. (See also Annex Ia.)

Furthermore, it could be argued that the final Swedish report to some extent represents more stakeholders than the ones involved. This is due to that several national activities have taken place the last years that have included a large number of stakeholders and that have resulted in agendas and other documents related to the scope of INSPIRATION. Several of the Swedish NKS have also been involved in these activities and have brought in valuable insights and results from these activities. E.g., The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) was commissioned by the Swedish Government in 2014 to analyze Swedish research. In order to fulfil this commission Formas has produced several background reports. The process applied, with high stakeholder interaction and a focus on research based on societal challenges, is to some extent similar to that of INSPIRATION and the reports therefore represent a synthesis of several expert opinions. Also, Sweden´s Innovation Agency (VINNOVA) together with Formas and the Swedish Energy Agency has financed a large number (more than 80) of strategic research and innovation agendas. These are in short presented in an agenda catalogue (Strategiska innovationsagendor (2015)), and several of the agendas are related to the scope of INSPIRATION and are referred to in this delivery. They were developed by actors that want to develop an area and that have, based on common visions and goals formed, worked out strategies for the development of the area.

15.3 Research and Innovation (R&I) needs

15.3.1 Societal challenges and needs

Several NKS mention that the EU challenges, although important, appear biased towards the human perspective. Headline challenges should also reflect the value and protection of nature as such. Aspects mentioned as important and potentially relevant “headings” are conservation and restoration of nature and biodiversity and sustainable use of ecosystem services. Biodiversity is particularly important and related to many of the other challenges.

Contribute to a healthy living environment, Contribute to food security and food safety and Ensure secure supplies of safe drinking water are all mentioned as highly important, but closely related to each other. Drinking water could be considered as “food”, and food security and food safety could be subjects under Contribute to a healthy living environment. The three EU challenges are all highly rated. These are also related to the challenges of rapid (and sustainable) urbanization under which an existing and ageing built environment should also be considered. Contribute to a safe chemical and microbial environment is an important challenge within the broader challenge of Contribute to a healthy living environment for the INSPIRATION context (land/land management and the SSW-system).

Another view is that one of the major global threats to society and the environment is overconsumption. From this angle, Sustainable and reduced resource consumption would be a priority challenge (similar to the challenge Reduce raw material and resource consumption).

The one challenge that almost all respondents mention being of high importance is Climate change mitigation and social adaption. The discussions in the Stakeholder Workshop lead to the conclusion that this challenge ought to be considered an important “stand alone”-challenge, but also a component under most other challenges. It was stressed that also the understanding of climate change effects is important and not just mitigation and adaption.

Also mentioned as highly important are migration and other demographic challenges (ageing population, migration to cities, and ensuring developments in peripheral areas). The migration challenge is rapidly becoming urgent, and other challenges follow, increased need for housing food and water challenges being the most evident.

Urbanisation/urban areas can have significant impacts on soil/land resources due to soil sealing and as centres of consumption, generation of waste, flow of matter/chemicals and energy.

During the NKS workshop these challenges were discussed and assessed. While they are highly related to one another, there is also the problem of conflicts of interests and goal conflicts between the different challenges and measures to address these. It was suggested that the goal conflicts in themselves are an important societal challenge, for which there is a need of research on how to deal with them.

A list of the societal challenges and needs as specified in the interviews and in the workshops can be found in Annex III.

15.3.2 Topics / research needs to include in the SRA

SW-1 Climate change effects on surface and ground water and ground conditions (mitigation and adaptation)

The European research and innovation Roadmap for Climate Services (DG Research and Innovation 2015) has stated that there is a strong need for research and innovation in order to make climate services more relevant, credible and assessable to its users. In Sweden, the effects of a changing climate on social, economic and ecological systems, as well as accessibility to sustainably produced renewable energy are issues that are fairly high on the research agenda. According to the expert panel associated with the Formas report "Scope and effects of Swedish climate research" (Formas 2015d), the most important societal challenge within the climate area is the conversion to a more sustainable and climate-safe society with reduced greenhouse gas emissions. The panel further asserted that much of the basic research on climate issues in Sweden has been done within the natural sciences and that there is a need to broaden the research field to include social sciences and humanities, as well as trans- disciplinary and applied research. An example of this would be improved use of climate services for cost-efficient and sustainable community development.

The subject is also elaborated in The Swedish Background report: Checkpoint 2015 on climate change adaptation (Andersson et al 2015). The report concluded that there is not necessarily a lack of climate adaptation research, but rather a gap in how the research is being packaged and communicated to the research community and to stakeholders.

Following the conceptual model of INSPIRATION, specific topics marked "SH" originate in stakeholder interviews and the workshop and those marked "CN" originate in general research goals identified in the Swedish innovation and research bill, evaluations of Swedish research or identified by other concerned research centres.

Demand

- How to adapt energy efficient buildings and construction to climate change? (CN)
- How to adapt water- and agriculturally based production businesses to climate change? (CN)

Why? Societal decision makers that deal with climate change mitigation and adaptation measures (local, regional and national authorities and private businesses) need a robust evidence base in order to make informed decisions and enact cost-effective adaptation and mitigation measures. More research on the role of climate services and ecosystem services is important for addressing this.

Natural capital

- How to increase carbon storage while increasing wood and biomass production in forestry? (CN)
- How to maintain or increase agricultural productivity in a changing climate (crop selection, plant breeding, cultivation, soil preparation and water management)? (SH)
- How to prevent or minimise risks for infectious diseases in agriculture due to climate change? (CN)
- How to assess expected soil erosion and compaction in agro systems due to climate change? (CN)

- How geotechnical characteristics of ground conditions and soil stability are affected by more frequent extreme weather events such as torrential rains and flooding due to climate change to minimise risks for landslides and erosion together with their impacts? (CN)
- How sea level rise due to climate change and affects coastal erosion?

Why? There is a still growing need to assess how climate change impacts on various elements in the natural environment and particularly how these impacts in turn affect one another. This includes the needs for understanding of ecosystem dynamics, the ecology and regulatory mechanisms in the natural systems affected by climate change and development of ways to access the effects of climate change on ecosystems (adaptive traits, change in biodiversity, extinction rates, and migrating species)

Land management

- How can tools be developed for climate change adapted planning of the urban environment (storm water treatment and management, waste water systems, ground water levels, green and blue areas, cool areas etc.)?
- How does a changing climate affect ground stability, increased risk for landslides and a safe infrastructure for transportation and building? Models need to be developed.
- How can agricultural methods be adapted to a changing climate and how to manage potential risks? (CN)
- How to integrate climate change adaptation into forest planning and management? (CN)

Why? Climate change effects, mitigation and adaptation are issues that cross a number of disciplinary, sectorial, jurisdictional and administrative boundaries. There is still a need to develop methods to concretely address climate change in an intersectoral manner. Thus it is important that research take a broad, process-oriented focus on addressing problem-based governance and land management issues.

Net impacts

- What is needed for long term monitoring and evaluation of climate change adaptation actions in order to prioritize measures?
- How to achieve integration of approaches, solutions and policies in the nexus between the use of water, energy and food to support an efficient and sustainable utilization of natural resources? (CN)
- How can we develop standards and protocols for data in support of vulnerability and risk assessments, and decision-support systems?

Why? These issues deal with specific impacts of climate change within various types of territories (rural, urban, geological specificities etc.) and thus can lead to a better implementation of land use management and/or spatial planning.

SW-2 Safe and sustainable (drinking) water supply from water source to tap

Prerequisites for the supply of safe drinking water are raw water sources that are of as "clean" and high quality as possible. Groundwater is threatened by pollution and over-extraction, and the threats are increasing as a result of climate change and increasingly intensive human impacts. Increasing concentrations of organic matter in raw water affects treatment processes at water treatment plants as well as the biological processes in the distribution network. We need to *increase the protection of raw water sources* and the long-term *value of water* resources need to be addressed in order to raise the awareness in society in general and among planners and politicians specifically. Treatment processes at the plants need to be adapted to changes in raw water quality. There is also a need for long term *monitoring of* water sources (ground and surface water) with respect to contamination as well as plans for *protection* and *remediation* when necessary.

In **"A vision for water - Research and innovation agenda for the water sector in Sweden"** The Swedish Water & Wastewater Association (2014) addresses challenges and research needs within the water sector. Apart from the elaborated "Swedish challenges", vision and research and innovation needs the agenda also addresses the need for *better coordination and collaboration at various levels within EU, the Nordic countries and Sweden*. R & D requirements were identified within the areas of 1) risk analysis and economic assessments 2) effective and safe production of drinking water 3) effective and secure supply of drinking water and 4) safe water in private wells.

Following the conceptual model of INSPIRATION, Specific research topics marked "SH" originate in stakeholder interviews and the workshop and those marked "VW" originate in "A vision for water" (Swedish Water & Wastewater Association, 2014). *The research topics raised in the current report do not cover all issues raised in the "A vision for water". For a full picture we refer to the report, which is in English.*).

Demand

- How can models be developed to raise the awareness among planners and politicians of the long-term value of water resources?

Natural Capital

- How does natural organic material affect drinking water treatment and how to ensure the efficiency of water treatment plant processes with increased levels of such compounds in raw water? (VW)
- How can methods be developed for the *characterization of organic carbon in raw and drinking water*? This is expected to lead to new types of online sensors for process-control in the water treatment plant.

Why? One fifth of the 450,000 wells for private water provision are currently regarded as unsuitable for drinking water abstraction. Therefore there is a need for systematic mapping of water quality as a natural resource. Common problems include natural contaminants from bedrock and the penetration of microbiologically contaminated surface waters through well liners and easily permeated soil layers. Additionally, water of poor quality can be more corrosive and therefore cause leaching of harmful substances from material that is in contact with the water. (VW)

- How can we develop robust and reliable measurement methods for the detection of pathogens and/or antibiotic-resistant microorganisms, natural toxins and chemicals in raw water?

Why? These methods would strengthen work to protect raw water sources and should be linked to decision-support systems for water treatment plant operators. Monitoring with the help of model-based methods, software sensors and “sensor data fusion” are also of interest. (VW)

Land Management

- How to provide improved methods for land use planning and management in agricultural and forestry areas, and more effective runoff water management in urban (“soil sealed”) areas? (SH)
- How can different stakeholders’ and other countries’ claims on water resources be balanced using legal, economic and decision-making tools?(VW)
- How to develop of more efficient techniques for remediation of raw water sources affected by chemical accidents, contaminants (such as pharmaceuticals) and organic pollutants?

Why? Increased concentrations of organic matter are known to reduce the effectiveness of chlorine disinfection. They also increase corrosion in the distribution network and furthermore cause clogging of carbon filters so that these do not work as a chemical barrier.

Net Impacts

- How do human activities and behaviour (food production, farming near and “on” water resources, consumption habits) affect the quality/contamination levels in ground and surface water as drinking water resources? (SH)
- How have legislative measures taken (or not) prevented ”new” substances from affecting drinking water or sources for drinking water? (SH)
- How to develop tools and methods to measure the health effects associated with consumption of water and to enable the evaluation of the effects of various actions? (VW)
- How does climate change affect provision of drinking water? (SH)
- How do contaminants (such as PFAS, fertilizers, and pharmaceuticals) affect raw water quality, treatment processes and mixture toxicity and human health?
- How do diffuse sources/sum of contribution from many ”small” contaminant sources affect the quality/contamination levels in ground and surface water (SH)
- Which are the health effects from exposures of several contaminants (mixture/mixture toxicity) (SH)
- How are PFAS-substances, fertilizers, pharmaceuticals, unknowns in surface water and groundwater) affecting the cleaning process (SH)
- What materials in contact with water affect water quality and to what extent (SH)

Why? Different types of tools are required as ill-health can be of an acute nature caused by pathogens or of a chronic nature caused by prolonged exposure to chemical substances such as e.g. perflourated hydrocarbons and pesticide residues. (VW)

SW-3 Ensure efficient use of natural resources

The Swedish vision is to be the leading nation on resource smart use of materials by 2030. Swedish households and industries are in the front in an international perspective, with respect to reuse of material in waste.

Natural resources may be materials or substances extracted for use in products or used "as such". They can also be land and water resources which can be exploited for our need of space to build on, for recreational purposes, for food production and much more. As people buy and dispose of more and more products and as services becomes more expensive than even more advanced new products, little is repaired and reused by people. Re-use relies much upon industrial recycling. Land and water is exploited as populations and economies grow. The challenges related to efficient use of natural resources need, probably more than most challenges, integrated approaches and are to a great extent related to human behaviour and social sciences as well as to industry. Sweden has good opportunities to find innovative solutions for sustainable and "resource smart" use of materials.

Following the conceptual model of INSPIRATION, specific research topics marked "SH" originate in stakeholder interviews and workshop. Those marked "IA" originate in the general research goals identified in the Swedish Research and Innovation Agenda – "Resource-Efficient Material Utilization: Renewing Swedish Excellence". There are also some common research needs identified marked with "CN".

Demand

- How to provide innovative and resource efficient production and business models and methods for sustainable resource recovery? (IA)
- What Bedrock types could crushed replace natural gravel in different applications and where in Sweden you can find these bedrocks (SH)
- How to assess the intrinsic value of the environment, e.g. the value of nature in areas sparsely populated (today) in comparison to densely populated areas or the value of nature for today's population versus future generations? (SH)

Why? More research and development on these demands are still needed to facilitate resources and material conservation in production processes over a product's life cycle. It is important to create value based on function rather than selling new products. Balancing multifunctional use of many natural resources, for example combining recreation and forestry, is fundamental for both people's well-being and sound business models.

Natural Capital

- How to increase efficiency and sustainability in the use of forestry and agricultural resources? (CN)
- How bedrock types when crushed could be used in end products (ballast, industrial material) and replace natural gravel in different applications and where in Sweden you can find these bedrocks? (SH)
- How to develop combined novel pre-treatment and metallurgical operations, to make full use of ore concentrates, scrap and residues in order to maximize the economic outcome and minimize the environmental impact of the entire process chain? (SH)

Why? Increased knowledge from research on how to apply economic theories and methods (including cost-benefit analysis) to questions related to different goods and services from our natural resources is necessary for a sustainable development and for a cost efficient adaptation to climate change.

Land Management

- How to achieve sustainable soil management for efficient food production? (SH)
- What are the effects of recreation on human health and economic aspects of multiple uses of forests under the influence of climate change? (CN)
- How the inclusion of reuse as an opportunistic component can be used in industrial maintenance strategies (IA)

Why? There is still a great need of increased knowledge on how to balance the demand from society to the natural capital. Development of new methods and how to implement measures for a secure and sustainable development using the natural capital in a resource efficient way, is highly needed due to urbanisation, present life-styles and climate change.

Net Impact

- What are the socioeconomic impacts of strong environmental requirements in public procurement? (IA)
- What policy instruments can be used for stimulating the introduction of products on the market that are easily reused, repaired and recycled? (IA)
- How can development of recycling technology and efficient processes be used for sustainable resource recovery? (IA)
- How to develop methods for optimizing the sorting of data from the recycling process to produce and sell statistical overviews? (IA)
- How to do evaluations of the pros and cons of further developing the Ecodesign Directive? (IA)
- How to achieve changes in human behaviour, e.g. consumption patterns (driving forces, motivation, social and psychological effects)? (SH) (IA)

Why? Today's use of the natural resources still needs to be accompanied by an increased knowledge of how to generate strategies and measures for increased resource efficiency, decreased environmental pressure and improved businesses. Steering and governance processes are important for an efficient use of natural resources and to manage potential conflicts. By further research on how to apply a systems perspective on production activities and consumption patterns, improvements of resource efficiency and avoidance of negative effects of exploiting land and other resources, can be achieved. Environmental ethics and taking long term responsibility for "new" solutions and products is also important.

SW-4 How to reach sustainable urbanization?

This research area deals with several of the societal challenges which contribute to the built environment. The impacts of climate change as well as a number of societal trends, including rapid urbanization, ensuring development in peripheral areas, increased migration and an aging population, have led to the need for a more efficient, sustainable and productive built environment. These trends increase the pressures on resource use and existing urban infrastructures. This research area is also related to the functional built environment, regional development and increased competitiveness at the European and global scale. It is important in this area that authorities have the funding and mandate from the government to prioritize these measures and find ways to include all relevant actors (including civil society and the private sector) in addressing these challenges.

The Formas Evaluation of Swedish Building and Planning Research (Formas, 2013) mentions that research from the larger (technical) universities is quite practically-oriented towards Swedish building and planning practices and that the international dimension to such research plays a smaller role. The evaluation also mentions that more fundamental research is needed to ensure a research environment that is capable of meeting new societal challenges.

Following the conceptual model of INSPIRATION, specific topics marked “SH” originate in stakeholder interviews and the workshop and those marked “CN” originate in general research goals identified in the Swedish innovation and research bill, evaluations of Swedish research or identified by other concerned research centres.

Demands

- How can both densification and greening of cities be achieved? (CN)
- To what extent is increased underground building a viable option for sustainable urbanization? (CN)
- What role do noise and vibration-free environments play in sustainable urbanization? (CN)
- How can accessibility to sustainable and modern energy be assured? (CN)

Why? Innovation and quality in the built environment is seen as important in order to deal with the challenges of climate change, densification of cities and migration, coupled with the need to build in a sustainable manner and transition to sustainable consumption and production patterns.

Natural capital

- How can the design and multifunctional use of green and blue-green infrastructures be adapted to climate change? (SH)
- How can pressure on, and loss of, urban biodiversity be reduced? (CN)
- How can natural resources be used for efficient supply of alternative and energy efficient building materials (CN)
- What are the effects of a changing climate on ground stability and landslide risks for safe infrastructures? (SH)

Why? This is seen as important to deal with environmental and climate change adaptation issues, e.g. flood prevention and the linkage of urban-rural areas, while at the same time improving nature and people’s well-being, is imperative.

Land management

- How to design technologies and planning tools for climate change adaptation of resource efficient wastewater systems for a sustainable built environment? (CN)
- Which tools can be used for planning for effects of sea level rise and flooding i.e. adapted building in areas near coastal areas and waterways? (SH)
- Innovative technologies and processes for handling polluted materials and polluted land need to be developed as well as planning processes when building on old deposits and polluted land (SH)
- How can heritage governance of the built environment be ensured in a changing climate? (SH)
- How can we increase planning and preparedness for health threats due to heat waves and other severe climate change impacts? (SH)

Why? Again, the effects of a changing climate on the built environment and processes to manage infrastructure systems are still in demand. Both buildings and infrastructure need to be energy-efficient and resilient to climate change impacts as well as being socially sustainable (Formas “Meeting Societal Challenges”, 2015). New developments should also be sustainable, and urbanization processes need to be developed further.

Net impacts

- How can collaboration be improved and conflicts of interests avoided in urbanization processes? (CN)
- What are the barriers to sustainable development in the built environment (identified by all types of stakeholders, e.g. insurance, industry, authorities)?

Why? There is general agreement that all types of relevant stakeholders should be involved in decisions regarding the built environment and quality of life. Involving stakeholders in helping to elaborate applied-research questions can aid in the net impacts that such research (and ensuring policy decisions) might have. At the same time, examples from international research projects can be instrumental in providing Swedish research with “best practices”, new methods and processes.

SW-5 Sustainable agriculture and food production

In the strategic research program for *Future Agriculture*[30] *– Livestock, Crops and Land Use* (Bengtsson *et al.,* 2010) six major challenges were identified:

- Reduction of the environmental impact of agriculture and mitigation of climate change
- Adaptation of agriculture to a changing climate
- Management of present and potential risks
- Responses to societal values and contribution to policies
- Agriculture and rural development
- Resolution of conflicting goals of agriculture and land use

Another relevant publication is "Scenario Development as a Basis for Formulating a Research Program on Future Agriculture. A Methodological Approach (Öborn et al (2013)).

Based on above mentioned challenges, knowledge gaps were identified and used to identify key research questions. Some of the questions, listed below, are relevant from the perspective of physical planning and land use, and need to be addressed to prepare for an unknown future.

Following the conceptual model of INSPIRATION, specific research topics marked "SH" originate in stakeholder interviews and the workshop. Those marked "FA" originate in research goals identified by the Future Agriculture platform. There are also some common research needs identified marked with "CN".):

Demand:

- How can we achieve a sustainable food production in terms of quantity, quality, and minor environmental impact? (SH)

Why? Swedish agriculture faces the challenge of maintaining a balance between increasing its efficiency per unit (i.e. per hectare or per animal) and at the same time meeting society's demand for improvements in product quality, and invention of new products such as bioenergy. This is also in line with the increasing consumer demand for food produced in an ethical and environmental way. All of this requires further research and development.

Natural Capital *(FA)*

- What are the functions of different kinds of organisms and populations in real production systems?

[30] Future Agriculture is a strategic cross-disciplinary research platform at the Swedish Agricultural University, SLU, in which researchers, together with the agricultural sector, authorities and nongovernmental organizations, develop research to address the sustainable use of natural resources with emphasis on agricultural production, including farm animals, and land use. The aim is to function as a hub for knowledge synthesis and dialogue transfer between academia, industry and society, foster a new generation of agricultural researchers, and provide Swedish and international actors with science based knowledge to facilitate strategic decisions. More information regarding Future Agriculture is available at http://www.slu.se/en/collaborative-centres-and-projects/future-agriculture/.

- How can crop species and varieties, and livestock species and breeds, be adapted to new climatic conditions, such as higher temperatures, longer drought periods and extreme weather events, and what is the potential for domesticating 'new' species, e.g. to utilize marginal areas or organic waste?
- How can resource use efficiency and production be increased on agricultural land while maintaining ecosystem services, biodiversity and animal welfare?
- How can integrated systems, at different scales, for crop, livestock and energy production be designed and evaluated?
- Which options for new land uses are available and what are the potential advantages and disadvantages of using more land for different types of agricultural production?

Why? Adaptation of agriculture to a changing climate is necessary and the above mentioned issues are crucial for land management based on understanding the systems, processes and functions and in a changing climate.

Land Management *(FA)*

- What is the normative status of different forms of agricultural production of food, feed, energy etc., i.e., are they perceived as right or wrong in society?
- How do political processes related to climate, the environment, biodiversity, trade, rural development, animal health and welfare etc. lead to international, regional and national agreements, policy instruments and laws supporting or restricting agricultural land use and production?
- What are the effects and consequences of various international agreements, policies and laws on agricultural production and land use?
- How can threats to food security caused by climate change and other ecosystem changes or collapses be managed and avoided?
- How do agricultural production systems constitute threats for ecosystem resilience, and affect risks of ecosystem and environmental collapse, and climate-induced catastrophes?

Net Impacts

- What are the effects of increased competition for land based resources on producer prices and the economy in the agricultural sector, e.g. more large-scale and specialized production, or integration of production in new kinds of ownership and collaboration? (FA)
- What is the importance of different forms of land tenure, ownership, and collective action for agriculture and rural development? (FA)
- How do urban and rural areas interact through flows of natural resources, goods, energy, ideas, capital, people, and through means of transportation? (FA)
- How can economic and social sustainable development in rural areas and food security in cities be combined? (FA)
- What are the conflicts and trade-offs between different agricultural land uses, including conflicts between goals, different techniques and land management systems? (FA)
- What are the possibilities for resolving conflicts between urbanisation and agriculture, e.g. urban planning, urban farming and small-scale production in urban or peri-urban areas? (FA)

- How can trade-offs and synergies between ecosystem services, production, climate impact, biodiversity, animal and human welfare and health be identified and managed? (FA)
- What are the possibilities for multiple-use and multifunctional systems to resolve conflicts in agriculture and land use? (FA)
- How can agriculture mitigate land degradation and environmental pollution? (FA)
- How can nutrients, water and wastes at different scales be recycled more efficiently? (FA)
- What are the environmental and climate impacts of structural changes in agriculture– specialization versus integration, small scale versus large scale, and geographic localisation? (FA)
- How do human activities and behaviour affect food and water quality and production – We farm near and “on” the water, but little research today is done on the effects of exploiting land. (SH)

SW-6 Sustainable forestry[31]

Developing management strategies to ensure a sustainable forest landscape in the face of increasing societal and environmental pressures is a major challenge. To ensure the sustainability of Swedish forests and forestry, decision-making must be based on a solid scientific understanding of the relationships between climate change, ecosystem functioning, and the biophysical and social consequences of human intervention. There is increasing pressure on forestry to maintain, or even increase, biomass production in the boreal region. This does not necessarily mean other ecosystem services such as biodiversity or recreation will be unduly impacted, or that we will jeopardize long-term sustainability of soils and cause unacceptable deterioration in water quality. But it does mean that we need to use state-of-the-art knowledge to develop improved management-support tools. There is therefore an increasing pressure on the research community to integrate the wealth of biophysical and social science findings to create new knowledge that can strengthen forest governance and policy.

In the Future Forests program[32] five overarching questions have been identified to evaluate the sustainability of forestry in a contemporary and future perspective. These are marked (FF) below. Also, other research topics are covered, marked (SH), which were proposed by stakeholders.

Following the conceptual model of INSPIRATION, specific topics marked “SH” originate in stakeholder interviews and the workshop and those marked “FF” originate in the Future Forests Programme. Those marked “CN” originate in general research goals identified in the Swedish innovation and research bill, evaluations of Swedish research or identified by other concerned research centres.

Demand

- How can we combine a sustainable and multifunctional forestry and ensure accessibility to eco-system services (CN)

Why? Managing forests sustainably means increasing their benefits, including timber and bioenergy, to meet society’s needs in a way that conserves and maintains forest ecosystems for multipurpose use. How to meet society’s demands require further research.

Natural Capital

- Is the long-term sustainability of base cations threatened by biomass removal and how does this affect soil and surface water acidification? (FF)

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31 The introduction text was provided by Hjalmar Laudon, professor in Forest Landscape Biogeochemistry, Swedish University of Agricultural Sciences.

32 The Future Forests programme leads the interdisciplinary scientific development of forest governance and management science in Sweden. The programme started in 2009 in recognition that sustainable management of forest is a major societal challenge, where decision-makers must be able to merge scientific knowledge with differing perspectives on sustainable forest management. http://www.slu.se/en/collaborative-centres-and-projects/future-forests/about-future-forests/

- How is biomass grown and utilized as efficiently as possible from an economical as well as environmental viewpoint and how can forest residues, for example stumps, be used in bioenergy production (in a lifecycle perspective)? (CN)

Why? Forests cover about sixty percent of Sweden. Ample opportunities therefore exist to use its biomass for different purposes. Forests play an important role in tackling climate change. The trees can be processed and used to replace other materials in buildings or replace fossil carbon in fuels. Continuous research is needed to increase knowledge of both positive and negative aspects of different forestry practises and how to increase efficiency of uses of forest resources.

Land Management

- How can landscape approaches be used to improve the sustainability of forests and forestry (FF) and how can forest planning and management be adapted to climate change? (CN) What are the economic aspects of multiple use of forests under the influence of climate change? (CN)

Why? Due to the high pressure on land use today it is important to find solutions for how to utilize land in several different ways, including recreational use and values. It is also necessary to adapt plant choices and management to changed climate conditions. Increased knowledge of how biomass is grown and utilized as efficiently as possible from an economical as well as environmental viewpoint is fundamental.

Net Impact

- How is carbon sequestration in forests soils affected by different forest management strategies? (FF)
- How does forest management affect nutrient dynamics in soils, leakage to surface waters, and eventual export to the Baltic Sea? (FF)
- What is the contribution of forest cover to water quantity and quality, and how do different types of silvicultural systems affect the overall health of surface waters? (FF)

Why? The broad utility of forests for production, recreation, rural development and environment require continuous new knowledge to meet the changing sector and society needs. Forest operations regain an increased focus, i.e. wood flows, logistics and road construction and maintenance. Research on net impacts of e.g. new infrastructures for sustainable forest management and wood fibre for energy purposes is required. New methodologies and technologies in forest management are needed due to climate change adaptation and have to be reflected with the use of software and GIS applications. System analysis for sustainable bioenergy production from forestry resources are also needed (CN)

SW-7 Management of contaminated land, groundwater and sediments

Contaminated land, groundwater and sediments relate to several of the EU-challenges. Contaminated soil and sediment pose a particular problem since most pollutants (metals and organic contaminants) do adsorb to organic and mineral particles, contaminants accumulate and reach concentrations often several orders of magnitude higher than in water. The contaminants are often also less biodegradable when they are adsorbed to particles and the polluted sediments and soils will constitute a new chronic source of contaminants, years and decades after the emissions have stopped. Traditional remediation generally consists in excavation or dredging and landfill disposal, which is both highly disruptive to the environment (e.g. destroys habitats and cause re-suspension of contaminated particles) often expensive and it is questioned whether it is a sustainable solution. There is often also a long time-lag between when the emissions took place and when the sites are remediated. Climate and geological changes can accelerate these problems. E.g. the northern coastline of the Baltic Sea is subject to a post-glacial land uplift, which is revealing large amounts of deposited and highly contaminated fibre residues from the paper- and pulp industry and "sediment slides" cause a release *en masse* of sediment-bound contaminants. The fibre masses contain extreme concentrations of e.g. PCBs, dioxins and mercury and contaminant concentrations in eagle eggs are rising again. Ecosystem and ecosystem services are threatened at several levels, resulting in human health and ecological effects as well as economic and social effects.

New solutions are needed in order to on one hand reduce new emissions, i.e. prevent them from accumulating in the environment and on the other hand to remediate already polluted soils and sediments.

Several international and national research agendas deal with contaminated land[33]. It is stressed that "solutions oriented" research on environmental pollution is needed in general and specifically for risk assessment and remediation of contaminated land and sediments.

Specific research topics:

Demand:

- Research related to the "risk concept": Probability and consequences; what are acceptable levels of risk? How can we "live" with risks? Individual or societal level views in risk assessment. What is the intrinsic value of the environment?
- What environmental ethics aspects are relevant in contaminated land management and how can we take long term responsibility for "new" solutions – in the light of history and related to the use of ecosystem services
- How can we re-use excavated soil and minimize excavation of "clean" soil. How can we make use of contaminated sites as such (fit-for-purpose).

[33] e.g. the BONUS strategic research agenda 2011–2017, the SGI surveys on contaminated areas, VR1550 (2015), Background analysis and recommendations to the governmental bill on research and innovation.

Why? Risk based decisions usually include various kinds of valuations, although the grounds for these are not always clear. How can and do we value nature in sparsely populated areas (today) in comparison to densely populated areas, or value nature for today's population versus future generations?

Natural Capital

- How can we better understand, address and describe contaminant behaviour in the land-water-sediment system including; effects from secondary sources; sediment processes in situ (such as natural attenuation, compound transformation, and natural capping/burial) and "new"/emerging contaminants and their interaction with the soil-water-sediment system (research on toxicity, bioavailability, physicochemical properties, fate and transport, analytical methods (low detection limits))?
- Innovative strategies, methods and tools to sample/characterise and assess contaminants in bedrock, soil and sediment need to be developed. This includes assessment and modelling of contaminant "source to sea" and *in situ* transfer (flux) between and within (including bioavailability) compartments (sediment, biota, water). Also, biomimetic methods (for bioavailability and effect assessments) that can be used at early Tiers (Tier 1 or 2) methods (i.e. quick and inexpensive) need to be developed.
- We need to find or define indicators and descriptors of effects of contaminants on organisms (e.g. biomarkers) and on ecosystem services (e.g. mineralization of organic matter, plant production, healthy fish populations, and safe fish for consumption).

Why? We tend to focus on one medium at a time in research and fail to provide knowledge on the S-S-W-system needed in order to efficiently manage contamination in practice. We need a holistic view on the distribution, bioavailability and effects of environmental contaminants and an understanding of the interaction between compartments (soil-water-sediment-biota). Also, as primary sources, i.e. new emissions are dealt with, secondary sources become more important. Further, current risk assessment procedures for contaminated sites rely on guidelines that were developed for land sites and there is an urgent need to develop guidance, tools and methods suitable for contaminated sediment sites. With REACH and national restrictions we have become better at reducing our contaminant emissions. Still, however, "new" contaminants such as PFAS-substances are encountered in soil, groundwater and sediment and have to be dealt with.

Land Management:

Development of tools and methods for sustainable management and planning:

- How can we best prioritize between *contaminated sediment areas* with respect to protection of the water recipient (lake, sea) at a regional and national scale or prioritize between remediation options at a site?
- How can we assess climate related risks and "geotechnical risks", e.g. contaminated sites at locations vulnerable to flooding or land slides?
- Innovative and cost effective methods need to be developed (*in situ* or on-site remediation, more efficient "dig-and-dump" measures, remediation methods for

contaminants in the bedrock in general.) Also, long term monitoring is needed to provide feedback, and improve remediation techniques.

- Statistical and modelling approaches need to be developed, or adapted to the purpose, for determining so called “representative concentrations” (with respect to heterogeneity, variability) to minimize risk of over- och underestimate need for remediation. We also need to evaluate how information technology could be more efficiently used in contaminated land and sediment applications (e.g. new monitoring techniques, GIS techniques for mapping etc.).

Why? More sustainable remediation methods are needed than traditional excavation and landfilling. Also, in order to take on societal challenges new solutions and techniques should benefit from the advances in information technology. In general, environmental practices are still traditional and e.g. costs/measurements are high, resulting in few data. Continuous or long term measurement could provide e.g. a basis for research and for evaluating measures taken. Better/faster sensors as well as interfaces for data collection (apps) and presentations are needed.

Net Impacts

- What are the effects from diffuse contaminant sources or sum of contribution from many ”small” sources, from contaminant mixtures and what is the impact of contaminant sinks (such as sediments, fibre banks etc.) on ecosystem services in the light of land uprising and climate change?
- What are the risks from “new”/emerging contaminants? We need research on toxicity, bioavailability, physicochemical properties, fate and transport, analytical methods (low detection limits), especially PFAS-substances, fertilizers, pharmaceuticals, “unknowns”).
- How do approaches aiming at integrating social, economic and ecological dimensions in decision making succeed in meeting the original goals in real applications?
- Assessments of the net effect of remediation measures - what risks are actually reduced and to what extent are risks elevated by the remediation measures, e.g. spread of contaminated sediment due to excavation? In what time perspective?
- Research on long term efficiency, effectiveness and sustainability of remediation alternatives. This should include long-term monitoring to verify assessments and sustainability in solutions (e.g. long term performance of mitigation measures for vapour intrusion in buildings from volatile contaminants, of stabilized and solidified contaminated soil or sediments, of capping of sediments).

Why? Contaminated land management, strategies, tools etc. are to a great extent focused on the most hazardous point sources/single contaminants and questions arise whether we underestimate the threat from the many sites that have not individually been ranked as the worst contaminated ones, or from secondary sources. Decision support tools and approaches are generally intended to support informed decisions that are aiming at sustainable solutions. Transparency is a key component. Tools need to be easily accessible and user-friendly, in order to be used in practice. However, tools tend to be based on underlying (often complex) theories, equations as well as assumptions and simplifications or even judgment of values that may, or may not, be agreed but are “built in” in the methodology. In order to manage contaminated sites more sustainably we also need to learn from measures already taken.

SW-8 Biodiversity and ecosystem services

This interdisciplinary research area is relatively new and one of the major challenges is how knowledge can be better used in the management of ecosystem services and biodiversity by for example central government agencies, county administrative boards, municipalities and industry. Land and soil are sources for important services for human well-being and as such they provide a near-term stimulus to economic growth (Vincent, 2012). Land use and land use changes are closely related to biodiversity and ecosystem services. The complexity of the area can be illustrated by the not obvious trade-offs between climate change and biodiversity and how to determine what degree of climate change that corresponds to what change in biodiversity (e.g. Andersson et al (2012) and Olsson et al (2012)). Formas (2015a) analysed on-going research, knowledge gaps and needs and identified several concerns. The research topics below origin in this analysis.

Following the conceptual model of INSPIRATION, specific topics marked “SH” originate in stakeholder interviews and the workshop and those marked “CN” originate in general research goals identified in the Swedish innovation and research bill, evaluations of Swedish research or identified by other concerned research centres.

Demand

- What are the differences in valuations of stakeholder, individual and collective values, what is the temporal and context dependence of valuation, what methods can be used to in practice to manage values expressed in different terms (monetary, qualitative, quantitative) and how is precision in the valuation of different types of ecosystem services best achieved?

Natural Capital

- Which are the functional links and causal relationships between biodiversity, ecosystem functioning, ecosystem services and benefits?
- How can ecosystem functions in practice be measured and compared and how can awareness be raised of what can be measured at present?
- Which are the thresholds related to ecological and social resilience, with focus on how the concept resilience can become operational and used as a communication tool?
- How can/is/should less evident/visible ecosystem functions and services be included/accounted for, such as soil processes and certain cultural ecosystem services?

Land Management

- Trans-sectorial instruments for steering and governance are needed, and need to be assessed. How do different instruments affect each other and which are the effects of different levels and ambitions in the instruments?
- What are the institutional change requirements linked to, among other things, property rights, governance and solidified norms and values?
- How and with what instruments for steering and governance can we handle changes in society, in values and preferences?

- How do different trans-sectorial instruments for steering and governance affect each other and which are the effects of different levels and ambitions in the instruments?

Why and what?

Innovative instruments for steering and governance and scenarios and predictive and experimental approaches (e.g. ecological compensation) and models are needed. This includes a need of development of instruments as such and a need for processes for adaption and follow-up of instruments developed and used.

Net Impact

- What is the effect on biodiversity and ecosystem services when introducing them in planning processes such as environmental impact assessments and spatial planning?
- What is the connection between life style and consumption of ecosystem services and the consumers' dependence of and effect on ecosystem services including issues related to consumer awareness and responsibility?
- What are the effects of introducing economical risk assessment in e.g. environmental impact assessments?

SW-9 Communication and implementation: Societal reach and impact

Research *on* societal reach and impact should be of interest to funders as well as researchers as societal relevance and impact are becoming more and more important in motivating official and private funding and in evaluations, as mentioned by several NKS. The Formas Report (2015c) “Meeting societal challenges” concludes that there is a need to move away from traditional communication of results and data to a focus on reliability, trust and other soft values. Much of the societal relevance and practical impact of research is driven by how research is communicated and used as the basis of implementation in policy decisions and/or planning practices. It would be a good investment to allocate some funding on this research from research budgets within the scope of INSPIRATION (land/land use, soil-water-sediment). Examples identified are listed below:

Land management:

- How can tools and processes, novel possibilities related to Information Technology be developed?
- How can research questions be formulated from and adapted to specific stakeholder needs?
- How can the governance challenges and regulatory issues in integrating climate change intersectorally be addressed?

Why? There is still a need for finding novel ways to include relevant stakeholders in the research agendas, as well as in individual projects. The governance preconditions for research (e.g. jurisdictional and normative backgrounds) are also essential to understand how research can influence policy implementation. The Formas report “Meeting Societal Challenges” (Formas 2015c) asserts the importance of communication strategies between decision makers, scientists, practitioners and the public and involving them not only as the beneficiaries of the research results, but also in the “co-production” of knowledge.

Net impacts:

- What communication approaches/techniques/strategies/activities are efficient in practice (Cost/benefit)
- How can behavioural studies of how emotions and other “soft” factors affect decision making for land use questions?
- How can concepts of ecological and social resilience (i.e. thresholds and breaking points) be operationalised and used as communication tools?
- How do stakeholders value ecosystem services and how can these result in social, economic and environmental development?
- How can adaptive processes for the development, adaptation and assessment of ecosystem instruments be developed and how can they deal with change?*
- How do learning processes and implementation in various types of organisations help to implement ecosystem services?*

Why? Communication and involvement strategies demand time and resources, both for the researchers and for the users of knowledge. It is important to evaluate the costs and benefits of such strategies in order to make them as efficient and fair as possible. Understanding the human and behavioural elements (humanistic studies) of how knowledge of natural/technical science and land use planning are implemented and communicated is an area of that would better help to close the science-policy gap. Understanding learning processes, adaptive governance and instruments for implementation and valuation methods which include stakeholders are gaps identified in the Formas report “Analysis of research on biological diversity and ecosystem services” (Formas 2015a).

*from Formas 2015a “Analys av forskning om biologisk mångfald och ekosystemtjänster”

15.4 Experiences regarding connecting science to policy/practice

15.4.1 Use of knowledge

Defining scientific knowledge

Interviewees found it hard to judge how scientific knowledge differs from other types of knowledge, such as that possessed by stakeholders, consultants and other actors. These other types of knowledge are also very useful in addressing societal problems. Scientific research is not just delivered by universities and research institutes, but also by consultants or national and regional authorities, who can have a deep knowledge of an area.

In the NKS workshop the topic of what defines “scientific knowledge” and how it differs from other types of knowledge was discussed and made more precise. Scientific knowledge should be: 1) evidence-based, 2) generalizable, 3) verifiable, and 4) replicable. Scientific knowledge must also be evaluated, peer-reviewed, published and searchable. There was some discussion on the extent to which data (databases) could be classified as “scientific knowledge”, but the consensus was that data must be analysed before it becomes knowledge and can then be used by relevant stakeholders. However, this definition of scientific knowledge and its publication in peer-reviewed journals often means that it is not “user-friendly” and does not always reach the intended end-user groups.

Use of scientific knowledge

Most of the national and regional authorities interviewed regularly used scientific knowledge (almost daily) in their work, either as users and/or producers of such knowledge. It is important for authorities to also have sufficient knowledge capacity to pose the right follow-up questions to researchers and to themselves look for further possibilities to employ knowledge. They stressed the importance of policy-relevant and applied research, even though scientific peer-reviewed research is seen as a very important quality assurance. Most of the non-knowledge provider interviewees saw their role in “translating” and distributing scientific research further, for instance to branch organization members, or to municipalities, and other users.

The term “knowledge broker” is being used more and more in Sweden. These brokers aid in the process of translating societal needs to research questions and in transforming research results to new forms of information to increase its usefulness and societal relevance. This may be a role that national authorities can play. “Packaging” research from basic research to applied research and then in a form that can be used by decision-makers was seen as an important task. Thus, the key is to make research seen and heard by user groups. However, sometimes this packaging can be misleading if stakeholders only hear from the “rock stars” of research because they are best at promoting their research. But what about others that may do more robust research but don’t have the channels in to the users? A lack of understanding on quality requirements in provided data (e.g. in risk assessment of chemicals) makes it hard for authorities to make use of existing data from research, even though the use by authorities is referred to in motivation of societal impact in research applications.

Sources of scientific knowledge

Swedish interviewees from all areas were largely in agreement about the main sources of scientific knowledge they used. The types were mainly scientific papers, reports and web-sites (such as the Swedish portal for climate change adaptation portal: www.klimatanpassning.se), but most also stated that exchange of best-practices, both nationally and abroad were great sources of practical scientific knowledge. Interviewees also noted that one of the best forums for exchange of information between knowledge providers, knowledge funders and knowledge users was conferences where scientific information was presented in a policy-relevant way to both users and funders.

There was general agreement that Open- Access scientific publications helped to facilitate the access to and use of scientific publications by end-users and other researchers.

Use of state-of-the-art research findings

One regional authority interviewee stated that sometimes there is a grey zone between “basic research” and research that has been surveyed or collated. It is hard to be sure that the “research” used or “ordered” from research institutes is really state-of-the-art - that is, if it represents a thorough survey of all research or if it is just a cursory or partial survey. Often the methods used to do this type of research are not presented, and it is hard to use it as a basis for making policy decisions.

Good examples of state-of-the-art knowledge are the “Governmental investigation on climate change and provision of drinking water” (SOU 2015:51) where the investigators were careful to include all existing knowledge and the governmental report “Sweden facing climate change – threats and opportunities” (SOU 2007:60), which is still seen as an important synthesis today and has influenced policy.

It is more difficult to judge to what extent state-of-the-art research has been used in the formulation of policies. While state-of-the art research was considered to be quite good in Sweden, there are ways that this type of research can have a greater utility for society. One way that state-of-the-art research can have a better impact is if individuals rotate in positions between several areas of the “triple helix model”. An important comment is that research institutes coupled to relevant authorities is more common abroad than in Sweden, and that targeted and long term research based on policy needs are easier to accomplish when this is the case.

15.4.2 Possibilities to set the agenda

Respondents felt that they today have rather good possibilities to help set the national research agenda in Sweden. Regional authorities feel they have possibilities to influence the research agenda in a number of ways. One way is by responding to questionnaires sent by universities and national authorities that do research. In this manner it is possible to lift pertinent questions up to the research agenda. Other ways to influence the research agenda are to be representatives on various reference groups or to be policy advisors for investigations or research projects. Respondents also had possibilities to provide input into the upcoming Research and Innovation governmental bill. For some specific issues of high societal interest or attention (e.g. PFAS), groups are initiated comprising researchers, consultants, authorities etc. This attention also results in more focus these issues on the research agendas and in funding opportunities.

National policies/agendas sometimes reflect specific needs of stakeholders, but not always. For instance, stakeholders feel there is no national climate adaptation strategy in Sweden that would help their work. The government has power via financing to universities and authorities that do research, but most of the financing to national authorities is not long term. Thus, more long-term permanent research solutions are needed in e.g. climate adaptation for knowledge dissemination and for funding of adaptation measures. In another case, some of the Swedish environmental goals are not well thought out and hard to implement. There is also a need for research financing authorities to *better link national goals with allocating of funding*. Governance processes at all policy levels in e.g. the remediation of contaminated soils area are often dependent on specific persons and more work should be done to make these processes more transparent and institutionalised.

15.4.3 Science – policy – practice

Involvement in research

Many national authorities in Sweden also do their own research in the areas covered by INSPIRATION – soil management, land use, water, spatial planning and climate change adaptation and thus they are often involved directly in research applications in Sweden. Regional authorities are also occasionally involved directly in research applications, i.e. as a stakeholder partner responsible for communication and contribute with work-in-kind. Some private organizations and NGOs work with facilitating the science-policy interface in communication of research results, promoting the “triple helix model “and in syntheses of research and organising match-making events.

In general, interviewees thought that the earlier stakeholders (like regional authorities) can be involved in research projects, the better, and for some it is a pre-requisite to be able to take part in the formulation of research questions to take part in the project. Through collaborative and knowledge co-creation processes, stakeholders can influence research throughout the life of the project. A good example mentioned is the requirement that Ph.D.-students actually spend time and perform research at the involved authority or institute. Another way for users be involved in research is to suggest case study sites and be involved

in matchmaking meetings like those that preceded the Tuffo-Formas call ”Efficient Remediation of Contaminated Sites”[34].

A further suggestion that emerged during the workshop for involving relevant stakeholders to a greater degree in research is to involve them formally in projects as “implementers” or give them a role as a work package leader for implementation. This would help to ensure that the results of the research are actually being used, as far as possible, and strengthen their involvement in the project.

One of the challenges is that research should not be considered as finalized after a scientific publication. Some of the branch organizations and authorities see this as just the beginning of the process. While peer-reviewed publications are important in order to ensure scientific excellence, most users of the knowledge rarely read scientific journals and publications as they often end up in expensive and non-accessible publications. Thus the research appreciated, but difficult used in implementation of dealing with the societal challenges. One of the challenges for scientific research is to disseminate results to both the scientific community and to users. An example of this in Sweden is the strategic research program for MistraPharma which is a tool to develop important tools for the users and the policy process.

How is societal impact being assessed?

Sweden is currently in the process of exploring how the societal impact of scientific knowledge can be assessed and evaluated. The Formas report “Meeting societal challenges” (Formas 2015c) is a good example of this effort. In Sweden, assessment criteria for research applications generally include both scientific quality and societal relevance. However, some interviewees found the instructions for what is assessed as high societal value (especially communication with stakeholders/end users) somewhat unclear given that communication and implementation opportunities vary between different types of projects.

In 2015, (Swedish Research Council, 2015) following a national decision to fund 10 Strategic Research Areas, four research councils evaluated[35] the impact of the research strategy addressing the questions:1) How has the research been planned and steered (‘strategic management’)? 2) What is the quality, results and effects of the research? 3) What has been the strategic significance of the initiative for society and for the business sector? 4) What is the state of collaboration between universities and with other stakeholders? 5) What is the state of the link between the strategic research and education? The main strength of the strategic research investment has been its long-term focus. Shortcomings were mentioned in linking the strategic areas to the needs of society and the development of undergraduate programs and courses. Around 20 percent of the strategic research environments were facing challenges, both in respect of their research quality and their strategies.

[34] http://www.swedgeo.se/sv/vagledning--verktyg/fororenade-omraden/forskning-och-teknikutveckling/tuffo1

[35] https://publikationer.vr.se/produkt/evaluation-of-the-strategic-research-area-initiative-2010-2014/

Examples of assessing societal impact in Sweden:

- Formas has been commissioned to analyse how Swedish research funding has made an impact in meeting societal challenges in the areas of Environmental Sciences, Climate Sciences, Agricultural Sciences, and Building and Planning Sciences. The Formas analysis performed by a Nordic expert group was based on *case studies* provided by universities (Formas 2015c "Meeting societal challenges).
- Mistra (www.mistra.org) does stakeholder investigations in parallel with research projects and the MistraPharma is often mentioned as a good example. In the water sector there are a number of reports/evaluations on how scientific knowledge is used.
- In a survey and analysis of Swedish research institutes (Kontigo, 2015), the institutes and their effect on impact and reach of research was evaluated.

In terms of "measuring" or assessing the societal relevance of projects (and the SRA), workshop participants stressed the importance of following up on projects and the results, effects and impacts they may have made, after the life of the project. This, however, requires resources, either on the part of the research funders, or as integrated into longer-term projects that allow for the follow-up (and follow-through) phases.

Several indicators of societal impact were identified in the interviews and discussed in detail during the workshop. The focus was on developing **qualitative** indicators, rather than only **quantitative** indicators. A distinction was made between **long-term indicators** that could measure effects and impacts of research further in the future, and **short-term indicators**. The problem with long-term indicators is that there is often a long time-lapse between the end of a project and when the impact may be felt. There is also the problem of establishing causality, as it may be impossible to attribute the result of a project to an actual outcome (which may be the result of other factors). Thus it is difficult to quickly and easily assess societal impact.

Societal "reach" may be a possible proxy for impact and give an indication of the potential impact of research by the extent to which it involves relevant stakeholders in research and communicates its results to end-users, the academic community and branch organizations.

During the workshop the three most important indicators chosen for societal impact and reach of both the SRA and individual projects (in order of relevance and practicality) were:

1. How relevant stakeholders involved in R&I-projects
2. How project results can directly be implemented in consulting/policy/or other relevant implementation route
3. How R&I-projects or R&I-applications bring in relevant and professional resources for communication and implementation

The full list of indicators and their further elaboration is provided in Annex IV.

References and recommended documents that deal specifically with the Science-policy interface are found in Annex II and marked **(SPI)**.

15.5 National and transnational funding schemes

15.5.1 Funding schemes and possibilities for research funding

Experiences and expectations

A positive trend experienced is that several national funders have opened up for research and innovation on solutions to societal challenges and also included a focus on the national environmental goals. The VINNOVA calls "**Challenge driven innovation**" and Formas Sustainable development of the built environment are mentioned as good examples. Also **BIG** ("Branschsamverkan i grunden" or "**Industry collaboration in the foundation** www.big-geo.se/) is mentioned as a good example, especially with its intention to last as a Programme for 10 years. BIG focuses on the efficient and secure foundation of transport infrastructure.

Swedish Water Development (SVU) is the local authorities' own R&D program on municipal Water & Wastewater technology. The business is predominantly focused on applied research and development in the interest of Swedish Water members. The SVU has continuous calls relates to the Soil-/Sediment-/Water-system. The demand for stakeholder involvement and dissemination is high, and this funder offers good opportunities for future research within the scope of INSPIRATION.

Internationally the **SNOWMAN Network (www.snowmannetwork.com)** concept is mentioned as a good example of transnational calls. The added value compared to other calls is the focus on interaction and dissemination, not only with respect to stakeholders but also between funded projects. In joint meetings possibilities for interaction and added values are addressed. There has been continuous follow up on dissemination activities by a Knowledge Dissemination Group which has also actively supported dissemination activities and as a result even more dissemination than anticipated and initially planned for is the case. Another added value of the meetings has been that they also served as matchmaking meetings between researcher and new constellations were formed for future transnational calls.

Swedish researchers also have high expectations in the **BONUS** program (Currently the Blue Baltic call, due March 10, 2016) and the **Water JPI**.

In a Nordic perspective, Nordic Innovation (www.nordicinnovation.org) and **Nordforsk** (www.nordforsk.org/en?set_language=en) offer possibilities. Nordic Innovation is a Nordic institution working to promote cross-border trade and innovation. Nordforsk is an organisation that facilitates and provides funding for Nordic research cooperation and research infrastructure.

Swedish researchers have also been very successful, and have expectations for the future, in the **ESPON (European Territorial Observatory Network)** (www.espon.eu) where transnational consortium provide applied research on subjects such as land-use, climate change adaptation, demographic issues and territorial governance

The above mentioned funding instruments constitute a few examples. In appendix V a list large number of National funding options is provided and some European funding options (main emphasis was on listing Swedish options).

Best ways to govern funding options so that societal demands will be fulfilled

Several actors have provided recommendations to the governmental bill on research and innovation, e.g. IQS (2015), VR1550 (2015)*, Svenskt Vatten (2015), SGI (2015b). The recommendations in documents, the interviews and the discussions in the Swedish Stakeholder workshop form the basis for the suggestions below.*

The Swedish NKS agree that there is not one best way of funding research directed towards fulfilling societal demands. A general need expressed by several stakeholders is, however, that the academic status of applied research is raised in order to increase the overall success rate in applied science applications in "open" calls. "Targeted" calls are generally considered better instruments today for applied research dealing with societal challenges. Also, targeted calls are often more "flexible" tools than open calls, and giving funders the possibility to try out different forms that can be adjusted over the years. Furthermore, keywords for taking on the challenges are transdisciplinarity, holistic approaches, transnational collaboration, needs-based and solutions-oriented research and stakeholder interaction and involvement from start to end. Along with securing these aspects in funding comes the added value of better reach and impact.

Some important key issues or aspects were mentioned as well as funding options that meet these key issues. The key issues were:

- Increased academic status of applied research.
- Project time – 3 year research projects is considered too short to include the implementation step properly in most cases
- "Real" stakeholder involvement from idea to implementation
- Efficient and relevant communication – communications plans important tools
- Solutions to societal demands may be "step wise", and opportunities to get funding to continue on successful projects can be important

In order to take on these aspects some funding options, or components in calls, considered successful (or that has potential to be successful) were mentioned:

- 2-step applications where the first step constitutes a sketch including the idea and the imagined/proposed consortia (including stakeholders). First step evaluation is based on the *potential* of the idea. A number of ideas pass on to step two. *This gives a high success rate and less involvement of stakeholders in ideas that do not get funding.*
- Opportunity for projects to build on project results in a second project, i.e. to take results a step further. Call 2 is open for call 1- projects, resulting in a possibility to take results a step further – and more likely towards implementation.
- Increased weight in evaluations of applications on societal relevance, users' needs and how results will be communicated and implemented efficiently in the applications.
- Separate communication and implementation projects that *continue one year after the research has ended*. A professional project communicator and a reference group works/interacts with the project during the project time and an extra year. (Ref Swedish EPA, the call "Storslagen Fjällmiljö").

- Specific requirements for each project granted to work on a communication and implementation plan with support from a professional communicator. (Ref the Swedish Centre for Innovation and Quality in the Built Environment)
- Including competence that can assess “impact and reach” in evaluation boards – and make sure that they have influence in the process.
- Formalising stakeholder interaction – An option can be to form “contracts” or agreements between researchers and stakeholders in order to make expectations and premises for engagement clear. This may include expected engagement in implementation as well as how stakeholders interact during the project.
- Funder interaction in matchmaking – active support towards good applications
- Clustering and synthesis: A funder may after a program or call, identify projects that have dealt with similar issues and fund a synthesis. This could support communication and implementation as well and constituting a platform for new research collaborations.
- Reservation of a portion of the funding budgets for longer-term strategic research programmes which can be sought by universities and research institutes, while the rest of the funding is earmarked for shorter-term applied research that is open to all categories of applicants. This is a way for national funders to deal with the science-policy gap.
- Follow-up or assessments by the funders after the projects are finalized (longer term perspective) as well as during the project. There should also be a plan to change the governing accordingly.
- New “forms” of co-funding - e.g. SMEs, local municipalities or different carriers of knowledge are given opportunities to participate. By allowing for greater financial contributions from economically stronger actors to finance participation of economically weaker actors in a “common pot” or that part of the project budget can be used for project related cooperation with SMEs (Formas (2015a)).
- Ensuring sufficient time between the call announcement and submission deadline for the call in order to form the relevant consortia, write a good application etc.
- Information to stakeholders when launching calls, in order to ensure early involvement.
- Calls for funding of long term (e.g.10 year) strategic innovation programs directed at identified challenges.
- Targeted calls directed towards challenges which lack strong research environments
- Demonstration and test beds. Challenge-driven research and innovation requires large investments, have long cycles, and is project-based and fragmented. New technologies, processes and methods need to be verified on a smaller scale before implementation on a large scale. There is also a need for resources for demonstration projects.
- Program for mobility between academia, industry and the public sector.

Several good examples were mentioned by the NKS:

- The Swedish Water Project Program. The program links together different problem-based topics and research constellations. This has also lead to better conditions for co-financing and a sufficiently cross-sectorial approach.
- MISTRAPHARMA – Success factors mentioned are long project time (8 years) and great focus on stakeholder involvement as well as the funder's (MISTRA) contact with the project throughout the project time.
- The SNOWMAN network calls, with specific attention to communication throughout the projects (SNOWMAN started as an ERA-net and ERA-Nets are in general mentioned as good examples by several NKS).
- The call "Storslagen Fjällmiljö" (Grand Mountain Environment), with its extra year focused on communication and implementation.
- "Concepts" as Test-beds, Living labs
- Biodiversa, BONUS & JPI Water

Possibilities to build on existing and new constellations of public and private actors in sectors such as water, contaminated areas or climate give better conditions for co-financing. These constellations tend to be successful as such. A mix is, however, often needed to ensure that certain problem-based questions do not fall between the cracks of different funders, or calls. But not all research funders or calls in Sweden set the same conditions or demands for such constellations. Some make co-financing a prerequisite while in some calls such co-financing or even coordination of use of different funds, can be difficult.

A suggestion raised in order to increase the financial means of calls is to nationally (or internationally) identify "small" funding sources and gather them in large national calls or if possible in "common pots". This could allow for larger budgets for each project funded, and an added value for the funders and that more projects are funded. The risk with this approach is that there may be research questions that do not fit in, are not covered or cannot compete (although important). Therefore, several NKS express the need to maintain a mix of funding mechanisms and that the advantages of a national mix (sometimes referred to as a "scattered" funding landscape) outweigh the advantageous of a few mechanisms with large financial means. Furthermore, the trend in research funding is to secure and ensure the societal impact of research, and the various funders try out different ways to achieve this. This provides a national portfolio of good examples and stepwise improvements in funding research that effectively contributes to solutions to societal challenges.

Several NKS mention the positive effects of "seed-money" or step-wise calls in which money is invested in the process of developing a project idea and concept and in building competitive consortia. These projects tend to be developed and performed in closer collaboration between stakeholders and researchers. It is also advantageous for international collaborations where the building of research consortia and the involvement of stakeholders are even more difficult and time consuming as well as costly.

15.5.2 Gaps in financial resources for research

Areas of R&I that are not yet covered by financing schemes

Only a few specific examples were given:

- One area falling behind is pipeline construction and maintenance. Several topics in this area deal with questions that do not fit in to Vinnova's funding scheme, even though they deal with competitiveness and export. Innovation procurement was also moved from Vinnova's responsibility and thus efforts there were ended. These could be pursued with EU-funding.
- The interface between land use and beck limnology also seems to have fallen between the cracks in funding opportunities.
- More research on the processes and the connection between knowledge and its use in planning and policy. Steering and governance of these issues are important, as well as how processes can be made more efficient and stakeholders can be better mobilized in planning processes.
- Polluted areas have been seen as topics in Nordic and EU calls (e.g. SNOWMAN). Formas supports environmental research nationally in open and targeted calls, but the success rate has been limited. Some NKS suggest that this may be due to the applied nature of the subject, and that targeted calls are needed. Targeted calls are, however, usually short-term and there is a need for a longer term program and a part that has specific responsibility for the funding of the soil-water-sediment field in relation to contamination and specifically solutions oriented research[36].

Integrated approaches

In order to perform research in a more trans-disciplinary way it is important to start working like this early, already in the stage of PhD writing. Trans-disciplinary courses are available now, but it takes time to get used to. It is also important that persons within preparatory panels recognize the added value of this approach. Targeted calls often succeed better with this, according to the NKS and even international funding opportunities, such as ERA-NET e.g. SNOWMAN and JPI provide good examples. Yet, additional platforms are needed and it is important that the different disciples can understand one another already at the beginning of the project application stage. A trans-disciplinary approach is also difficult to implement in smaller projects. Both writing the funding applications and implementing the projects demand more time and thus more funding than a single disciplinary project.

A good mix of different disciplines and stakeholders in research projects will continue to be important. Flooding/storm water programmes are examples of research topics that force actors to work together but there is still a lack of competence in certain areas. Other trans-disciplinary topics are the bio-economy, especially linked to innovation and resource recycling where systems analysis and environmental economists are needed. But these types of applications take time to write. Both natural scientists and social scientists need to "own" the questions.

[36] Since the interviews were performed, The Swedish Geotechnical Institute has, however, been given the opportunity to provide yearly funding within this area, by launching a first call in 2016 and providing funding for the first projects in 2017.

15.6 Annexes

Annex Ia: NKS interviews in Sweden

Date of interview	Organisation	Interview	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	soil	sediment	water	land use-management
15-10-20	The Swedish Research Council, FORMAS	Elisabet Göransson, Lisa Granelli	1			1							1	1	1	1
15-10-21	Swedish Geotechnical Institute	Charlotte Cederbom		1	1	1	1						1			1
15-10-22	Repr of all Sw County Adm boards on behalf of EPA	Klas Köhler		1		1							1	1	1	
15-10-23	Umeå University	Mats Tysklind			1		1				1		1	1	1	1
15-10-27	Nordregio	Kjell Nilsson	1		1		1								1	1
15-10-28	The Swedish Water & Wastewater Association	Daniel Hellström	1	1	1				1	1	1		1	1	1	1
15-11-05	The Swedish Centre for Innovation and Quality in the Built Environment (IQ samhällsbyggnad)	Eva Schelin	1	1	1					1	1		1	1	1	1
15-11-05	Swedish Forest Agency	Hillevi Eriksson		1		1							1			1
15-11-09	Stockholm county adm board	Karin Willis		1												1
15-11-11	Stockholm University	Jonas Gunnarsson			1		1						1	1	1	

15-11-27	National Agency, Sweden	[37]		1	1	1								1	
15-12-03	Sweco	Anna Yman	1	1				1					1	1	1	1
15-12-04	Geological Survey of Sweden	Göran Risberg	1	1	1	1							1	1	1	1
15-12-04	Department of Environmental Science and Analytical Chemistry (ACES)	Marlene Ågerstrand			1		1						1	1	1	
15-12-04	SBUF (the construction industry's organisation for research and development)	Ruben Aronsson	1						1				1		1	1
15-12-08	NCC	Jan Byfors		1					1							1
15-12-15	Swedish Environmental Protection Agency	Marianne Lilliesköld	1	1		1							1	1	1	1
15-12-18	VINNOVA- Sweden's innovation agency	Sebastian Axelsson	1			1							1	1	1	1

Several more stakeholders have contributed, although not formally involved as NKS, e.g. by participating in the Stakeholder Workshop or by contributing with information and documents, or by providing feedback on texts. These are: David Bendz, Research Director at SGI, Dan Berggren Kleja, Professor in soil sciences, Swedish Agricultural University, Hjalmar Laudon, Responsible for land and water issues in the Future Forest Program, Swedish Agricultural University , Hjördis Löfroth, Research coordinator Natural disasters and climate change adaptation SGI, Johan Skarendahl, The Swedish Centre for Innovation and Quality in the Built Environment (IQ samhällsbyggnad), Lars Andersson, Professor and Head of the Future Agriculture Program, Swedish University of Agricultural Sciences, Lisa Granelli, Senior Research Officer, Formas, Tomas Johansson, Swedish Board of Agriculture, Peter Bruce, Stockholm University.

In the review of the report some stakeholders focused specifically on certain parts. Elisabet Göransson, Lisa Granelli, Marlene Ågerstrand, Daniel Hellström and Johan Skarendahl took specific interest in the part related to funding opportunities with constructive feedback, comments and remarks. Marlene Ågerstrand, Daniel Hellström, Lisa Granelli, Elisabet Göransson and David Bendz contributed specifically to the Science-policy/Science-implementation interface part. For the R&I-agenda and research questions part Daniel Hellström, Dan Berggren Kleja, David Bendz, Jonas Gunnarsson, Peter Bruce, Tomas Johansson, Charlotte Cederbom contributed with specific review comments and contributions.

[37] The respondent wish to stay anonymous

Annex Ib: NKS questionnaire template

See Chapter 1, Annex I

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

See Chapter 1, Annex II

Annex II: Documents used for the Swedish desk study

Andersson L., Bohman A., van Well L., Jonsson A., Persson G. och Farelius J. (2015). Underlag till kontrollstation 2015 för anpassning till ett förändrat klimat. SMHI Klimatologi Nr 12, SMHI, SE-601 76 Norrköping, Sverige.

Andersson P., Palme U. (2012) Markanvändningens effekter på växthusgaser, biologisk mångfald och vatten. IBSN 978-91-620-6509-6 (Rapporten bygger på Naturvårdsverkets rapport 6505)

Bengtsson J, Magnusson U, Rydhmer L, Jensen ES, Vrede K, Öborn I. 2010. Future Agriculture – livestock, crops and land use. A strategic programme for research. Swedish University of Agricultural Sciences (SLU). ISBN: 978- 91-576-9008-1. [On line]. Available from: http://www. slu.se/en/collaborative-centres-and-projects/future- agriculture/publications-and-printed-matter.

Olsson, M., Andersson, P., Lennartsson, T., Lenoir, L., Mattson, L, Palme U., Land management meeting several environmental objectives Minimizing impacts on greenhouse gas emissions, biodiversity and water Knowledge compilation and systems perspectives, Naturvårdsverket Report 6505, 2012

Ares (2009) 326974 - 17/11/2009 Guidance for assessing Social Impacts within the Commission Impact Assessment system. **(SPI)**

BONUS strategic research agenda 2011–2017, update 2014 - http://www.bonusportal.org/files/2974/BONUS_Briefing_22_SRA2014_update.pdf

EU Baltic Sea Strategy - http://www.balticsea-region-strategy.eu/

Effektiv energianvändning (2014). - Forsknings- och innovationsagenda för effektiv energianvändning. **(SRIA)**

Formas (2011). Analys av miljöforskningen och förslag till forskningsstrategi 2011−2016 Rapport: R4:2011 ISBN 978-91-540-6058-0, ISSN 1653-3003

Formas (2012). Forsknings- och innovationsstrategi för en biobaserad samhällsekonomi. Rapport utarbetad på uppdrag av regeringen av Formas i samråd med VINNOVA och Energimyndigheten Rapport: R2:2012 ISBN 978-91-540-6067-2.

Formas (2013). Evaluation of swedish building and planning research.

Formas (2015a). Analys av forskning om biologisk mångfald och ekosystemtjänster.

Formas. (2015b). Forskning till stöd för att uppnå miljökvalitetsmålet Giftfri miljö – Analys och strategi.

Formas (2015c). Meeting societal challenges.

Formas (2015d). Omfattning och effekter av svensk klimatforskning.

Future Forests - Sustainable Strategies under Uncertainty and Risk Program Plan 2009 (in English). http://www.mistra.org/download/18.28e913871380e4c8e623dc/Future%2BForest%2Bprogramplan%2B2009.pdf **(SRIA)**

Future Forests - Program Plan 2013 – 2016 (November 2012). http://www.slu.se/Global/externwebben/centrumbildningar-projekt/futureforests/Future%20Forests%202013-2016.pdf **(SRIA)**

Hållbar Sanering (2009a). Sammanfattning av kunskapsluckor identifierade inom Hållbar Sanering Beredningsgruppen för Hållbar Sanering

Hållbar sanering (2009b). Forsknings och utvecklingsbehov inom efterbehandling av förorenade områden.

IQS (2015). IQ Samhällsbyggnads inspel till den forskningspolitiska propositionen 2016

The Swedish metals-producing Industry's associations (2013). National action for metallic materials – A strategic research and innovation agenda **(SRIA)**

Kontigo (2015). Svenska forskningsinstitut inom formas ansvarsområden. Kartläggning och analys. På uppdrag av Formas **(SPI)**

Langfeldt, L; Scordato L. (2015). Assessing the broader impacts of research. A review of methods and practices. Nordic Institute for Studies in Innovation, Research and Education (NIFU). Working Paper 8/2015 Ett uppdrag åt Formas - Forskningsrådet för miljö, areella näringar och samhällsbyggande. **(SPI)**

MINBAS Innovation agenda (2013). En forsknings och -innovationsagenda för Mineral, Ballast och Sten **(SRIA)**

Moermond et al. (2015). Cred: criteria for reporting and evaluating ecotoxic data. Environmental Toxicology and Chemistry. DOI 10.1002/etc.3259 **(SPI)**

Naturvårdsverket (2002). Kunskapsförsörjning inom efterbehandling av förorenade områden. Rapport 5252.

Sandgren M, Thor M. (2015) Hållbar skörd av råvara – Kombination av två starka svenska kunskapsområden: Skogsnäring och arbetsmaskiner. Strategisk agenda för forskning och innovation. Sustainable harvesting of forest raw material**.** http://www.nra-sweden.se/sites/nra-sweden.se/files/hallbar_skord_final.pdf **(SRIA)**

Sandström, U. (2015). Ecosystem services: Mapping of publication Activities and Trends for Sweden and other Countries 2004-2014.

SGI Publikation 12 (2014). Förorenade områden –Inventering av effektivitetshinder och kunskapsbehov 2013

SGI Publikation 17 (2015a). Förorenade områden – Inventering av effektivitetshinder och kunskapsbehov 2014 Förorenade områden i den fysiska planeringen

SGI (2015b) Underlag till regeringens forsknings politik. 2015-10-28 Diarienr. 5.0-1505-0329

SGI VARIA 620 (2011). Förorenade områden - Inventering av

effektivitetshinder och kunskapsbehov, 2010

SGI VARIA 629 (2012). Förorenade områden – Inventering av effektivitetshinder och kunskapsbehov 2011

Skogsstyrelsen (2007). Svenskt skogsbruk möter klimatförändringarna. Rapport nr. 8/2007.

Skogsstyrelsen (2008). Åtgärder för ett uthålligt brukande av skogsmarken. Rapport nr. 13/2008.

Skogsstyrelsen, SLU (2015). Effekter av ett förändrat klimat – SKA 15.

Swedish Research Council (2015). Evaluation of the strategic reasearch areas initiative 2010-2014. ISBN 978-91-7307-282-3

Svenskt vatten (2013). A vision for water research and innovation agenda for the water sector in sweden (published in English in September 2014) **(SRIA)**

Svenskt vatten (2015). Svenskt Vattens inspel till regeringens förestående forskningspolitiska proposition

Strategiska innovationsagendor (2015). Agendakatalog Juni 2015. Vinnova, energimyndigheten, Formas. **(catalogue covering more than 80 SRIA:s)**

Strategic research and innovation agenda for the Swedish metal and mining industry (STRIM) (2013) **(SRIA)**

The Research and Innovation Agenda – "Resource-Efficient Material Utilization: Renewing Swedish Excellence" (2014). RESURSSMART MATERIALANVÄNDNING– så förnyar vi svenska styrkeområden. **(SRIA)**

The joint Baltic Sea research and development programme, Strategic research agenda, 2011-2017 – update. Publication 14.
http://www.bonusportal.org/files/2981/Publication_No._14_update.pdf **(SRIA)**

The European Technology Platform for Water (2010). WssTP Strategic Research Agenda, A common vision for water innovation. **(SRIA)**

Vesterberg B, Lind B. (2016) "Effektivare markbyggande och FoU för ett hållbart samhälle." Bygg &Teknik 1/16

Vincent, Jeffrey R. (2012). Ecosystem Services and Green Growth. Policy Research Working Paper; No. 6233. World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/12084 License: CC BY 3.0 Unported

VR1550 (2015). ANALYS OCH FÖRSLAG TILL REGERINGENS FORSKNINGS- OCH INNOVATIONSPROPOSITION. Redovisning av regeringsuppdrag (U2015/1362/F) – gemensam analys från Energimyndigheten, Formas, Forte, Rymdstyrelsen, Vetenskapsrådet och VINNOVA. **(SPI)**

Ågerstrand et al (2011b). Ågerstrand, M., Kuester, A., Bachmann, J., Breitholtz, M., Ebert, I., Rechenberg, B.. . Stockholms universitet. (2011). Reporting and evaluation criteria as means towards a transparent use of ecotoxicity data for environmental risk assessment of pharmaceuticals. Environmental Pollution, 159(10), 2487. **(SPI)**

Ågerstrand, M., Berg, C., Björlenius, B., Breitholtz, M., Brunström, B., Fick, J.. . Umeå universitet. (2015). Improving environmental risk assessment of human pharmaceuticals. Environmental Science and Technology, 49(9), 5336. **(SPI)**

Ågerstrand M (2012). From science to policy. Improving environmental risk assesment and management of chemicals. Royal Institute of Technoogy. **(SPI)**

Öborn I., Bengtsson J., Hedenus F., Rydhmer L., Stenström M., Vrede K., Westin C. and Magnusson U. 2013. Scenario Development as a Basis for Formulating a Research Program on Future Agriculture: A Methodological Approach. Ambio 42:7, 823-839.

Annex III: List of challenges and needs

A list of challenges and mentioned by stakeholders in interviews and further elaborated in the NKS workshop. When similar, they are grouped together. The first six groups are the ones reflected by section 2.1 i.e. the most pronounced challenges in the view of all stakeholder interviews performed and from the discussions in the stakeholder workshop.

Group	Challenges[38]	Comments
1a	Pressure on natural environments, resources and ecosystems and loss of biodiversity	Ecosystem services are a tool that can be used to deal with this challenge
1b	Conservation and restoration of nature and biodiversity and sustainable use of ecosystem services	Related to challenges 3a,b,c,
1c	Nature preservation & biological diversity, halting the loss of biodiversity	
1d	Green and blue-green infrastructure	Related to 5a Rapid and sustainable urbanization
2a	A healthy living environment	
2b	A safe chemical and microbial environment	Relate to a Rapid and sustainable urbanization
2c	Food security and food safety	could be included under 2a or 2b and related to 3b (Transition to sustainable consumption and production patterns')
2d	Safe drinking water	could be included under 2a or 2b 2b and related to 3b (Transition to sustainable consumption and production patterns')
3a	Sustainable and reduced resource consumption	
3b	Transition to sustainable consumption and production patterns	
3c	Securing sustainable agricultural production chains	
3d	Sustainable forestry	
4a	Climate change mitigation and social adaption	Important that climate change mitigation and adaptation are integrated as a challenge in all other challenges, as well as remaining a challenge of its own.

[38] *Since several stakeholders mention challenges of similar nature, but not with the exact same words the authors have suggested a synthesis of the challenges.*

4b	Climate change	Climate change measures and services are highly integrated into challenges of the built environment (5a)
4c	Climate research - governance across different levels and sectors	Related to 7c Managing conflicts of interest
4d	Effects on climate change to ecosystems	
4e	Emissions of greenhouse gases	
5a	Rapid and sustainable urbanization	
5b	Aging built environment	Including challenges of waste management
5c	A sustainable Building Sector	
5d	Migration and other demographic challenges	Ageing population, migration to cities, ensuring developments in peripheral areas
6a	Accessibility to affordable, reliable, sustainable and modern energy	
6b	A biobased economy	
6c	Developing a circular economy	
7a	Decision making under uncertainty	
7b	Societal policy change barriers	
7c	Managing goal conflicts	(between various administrative levels and between different sectorial interests) Related to many of the other challenges above
7d	Need for research both “on” (basic research) and “for” (applied research)	

Annex IV: Indicators of societal reach and impact

Examples of indicators
Top three indicators (as ranked during the NKS workshop), applicable for the SRA and for individual projects
Relevant stakeholders involved in R&I-projects Notes: This is an indicator of the potential for projects to have a relevance for society and/or end users. Although the number or percentage of relevant stakeholders involved in R&I projects was ranked as the #1 indicator during the workshop with NKS, was what was deemed important, was more important were qualitative sub-indicators such as *which* stakeholder where involved, *how* they are involved and in *which stages* of the project they are involved. It was thought important that stakeholders are involved already from the beginning of projects and throughout the life of projects. A way to make this indicator more precise is for research financers to specify: • **The percentage of a project budget in which stakeholders are involved** (co-financing or work in-kind) • **Which stages of the project stakeholders are involved (e.g. problem formulation, implementation, dissemination)** • **Percentage of and how *inter-sectoral* researchers or stakeholders involved**
How project results can directly be implemented in consulting/policy/or other relevant implementation route Notes: This indicator shows a measure of policy awareness among researchers and an understanding of the policy process and how research fits into the greater societal context. This indicator was ranked as the #2 most important indicator during the NKS workshop. However, this indicator was also seen as more of a long-term result or impact indicator, which may not be immediately or easily measurable. It must be complemented by stepwise indicators such as how the results may be implemented and even indicators such as: • **Number (and nature) of contacts with relevant policymakers (authorities, members of Parliament, EU Commission, local, regional or national authorities etc.)**. • **Description of which policy processes are targeted by the research** These contacts are the first step in ensuring that the results of research can actually be used in policy or implementation.
How R&I-projects or R&I-applications bring in relevant and professional resources for communication and implementation Notes: This indicator was ranked #3 in importance during the NKS workshop. It was thought that projects that involve communicators (and creative communication methods) throughout the project life stand a better chance of being relevant for the various users/stakeholders. The project leader may not always be the appropriate person to manage communication in a project. Communicators' involvement at the end of projects is beneficial, but they could also be useful as integrated members throughout the project life. Communicators thus should have a very good understanding of the methods and results of the project. They must have sufficient understanding of the scientific aspects of the project or be able to "translate" the results into more easily understood language.

Other relevant indicators for the Strategic Research Agenda
Number and nature of research performed in cooperation with SMEs or NGOs (process indicator) Note: A very relevant process indicator that can help to assess how collaboration will occur
Number and nature of research institutes' support the application by joining on their own expense for own research, and sharing networks of stakeholders as well as creating bigger research platforms Note: Having relevant users/stakeholders as co-financers within projects is a good indicator that societal relevance may be achieved. • Degree of mobility between research-policy-business is also an important sub-indicator
Use of library services and other communication infrastructure (Open databases, webpages, platforms, interactive tools, etc.) by researchers outside the institute/university possessing the service Note: Hosting, administering and maintaining such research infrastructure takes resources and should be a part of the financing possibilities
Number and nature of new standards produced as the result of research Note: As an alternative to the more traditional indicator of "number of patents produced"; the way that research results in new or altered standards across Europe is an important indicator, particularly standards that open up for new markets
Fraction of/number of research projects that result in/are implemented in courses to students/industry/authorities etc. Note: Assess the potential for capacity building, communication and the dissemination of knowledge produced within the projects
Number and nature of tools, guidance papers, checklists produced
New businesses started as a result of research Note: An impact indicator which may be difficult to measure in the short-term

Annex V: List of funders and funding options

No	Name	Funder	Description	web-site
National				
1	Common	Agency for Marine and Water Management	The Swedish Agency for Marine and Water Management is responsible for marine and water planning, supervision and regulation. The Agency has taken over the bulk of the responsibility for marine and freshwater issues from the Swedish Environmental Protection Agency.	https://www.havochvatten.se/hav/vagledning--lagar/anslag-och-bidrag/aktuella-forskningsutlysningar.html
2	No name	Carl Trygger's Foundation for Scientific Research	The Carl Trygger´s Foundation's mission is to provide support for research in the subject areas of forestry and agricultural sciences, biology, chemistry and physics including these Sciences in engineering applications and with an orientation that is likely to contribute to business development in Sweden. There is an annual call submission deadline, normally in May each year.	www.carltryggersstiftelse.se
3	No name	CF Lundström's Foundation	The CF Lundstrom's Foundation (administrated by the Royal Swedish Academy of Agriculture and Forestry, KSLA) is to encourage-scientific research for the benefit of the country's industry and agriculture/forestry. Application in January 2016. The KSLA is also administrating other foundations that support scientific work in the agricultural and forestry sector.	http://www.ksla.se/anslag-stipendier/cf-lundstrom/
4	No name	Crafoord Foundation	The Crafoord Foundation's main objective is to support scientific research and education. Contribution is provided mainly to applicants at a selection of universities and colleges located in the southern part of Sweden. This year applications must have arrived at the Foundation by 4th February 2016.	www.crafoord.se
5	2016:1 Resource and climate efficient forestry	Energiforsk	Energiforsk is a research and knowledge-based company that operates and coordinates energy research. There is a brand new research program on Resource and Climate Efficient Pulpmill Industry that welcomes proposals. Research should be on concrete project on the problems experienced at pulp and paper mills. The projects will primarily look at how low-grade energy can be made useful, how organic residues can be used, how to increase the amount of domestically produced high-quality biofuels at the mills and process ventilation. Last day for applications is 1st February 2016.	www.energiforsk.se

6	Common	Energimyndigheten	The Swedish Energy Agency works for a sustainable energy system, combining ecological sustainability, competitiveness and security of supply. The Energy Agency is one of Sweden's largest research funding bodies. The Agency finances research for new and renewable energy technologies, smart grids, and vehicles and transport fuels of the future. The Agency supports commercialization and growth of energy related cleantech. A major part of the R&D activities funded by the Agency are conducted in different thematic programs. All calls are available at the website.	www.energimyndigheten.se
7	Common	Formas	The mission of Formas is to promote and support basic research and need-driven research in the areas Environment, Agricultural Sciences and Spatial Planning. One part of Formas mission is also to promote societal value of research, with an international perspective. To be eligible to apply to Formas for funding, the main applicant must have a Doctoral degree. Applications for information projects or for organising conferences, symposia and workshops are exceptions to this rule. All calls, open, future and closed, are available at the website.	www.formas.se
8	Formas-yearly conference-, symposia-, WS-support	Formas	Conferences, symposiums and workshops. There are three calls per year with three dates. Contribution to the costs for the organisation of conferences and workshops (meetings). The application must contain: aim, prel. programmes, Scientific Committee, invited speakers, number of participants, time, place and detailed budget. Meetings in Sweden are prioritised. Can be used for travel and accommodation for foreign participants, costs for meeting facilities and similar. Not for salary costs. Principal applicants need not have a doctor's degree.	www.formas.se
9	Formas-Communication project	Formas	Communication projects within Formas responsibilities. Next call is due to open 2016-03-30.	www.formas.se
10	Urgent Grants 2016	Formas	Urgent grants enable scientists to address recently identified research issues. For example, this may be an extreme event, such as storm-felled forests, defects in building construction resulting in collapse due to snow build-up, emission of environmentally hazardous substances following a disaster, or other specific circumstances that necessitate a study to be initiated immediately. Applications for urgent grants may also be submitted to make use of material that is available temporarily. Last day of application:	www.formas.se

			30/12/2016.	
11	ERA-NET Cofund Smart Urban Futures	Formas	JPI Urban Europe fourth call – the ERA-NET Cofund Smart Urban Futures (ENSUF) – supported by the European Commission under the Horizon 2020 programme, opened December 16, 2015. Three call topics are defined: • Concepts and strategies for smart urban transformation, growth and shrinkage • New dynamics of public services • Inclusive, vibrant and accessible urban communities. For this call a two-stage procedure will be adopted. In the first stage, consortia are invited to submit pre-proposals. Pre-proposal deadline: 15th March 2016.	www.formas.se
12	Formas yearly Open Call	Formas	The Swedish Research Council Formas annual open call will open March 3rd 2016 for applications within the Research Council's three areas of responsibility – Environment, Agricultural Sciences and Spatial Planning. The call will close April 14th. The research that is funded should be of the highest scientific quality and have a high likelihood of benefiting society in the short-term or long-term. In addition the research should produce knowledge that will contribute to the sustainable development of society – a development that meets the needs of today without jeopardising the resources available to future generations. This presupposes that the health and welfare of humans and animals, biodiversity, the environment and the viability of nature, economics, ethics and social cultural values are taken into consideration.	www.formas.se
13	Strategic Innovation Program BioInnovation	Formas, Energy Agency, Vinnova	The strategic innovation agenda Bio Innovation announces SEK 32 million for projects that clearly address bio-based innovations in public funded activities. The purpose of the call is to stimulate innovations of new bio-based materials, products and services developed in collaboration with publicly-funded activities. Innovations should have market potential of publicly-funded activities in Sweden, as well as the potential to achieve export success. Deadline for application to Vinnova is 5th April 2016.	www.formas.se
14	Sustainable Community building.	Formas	A number of calls for proposals: research projects, research projects for young researchers, development and demonstration projects, visiting scientist/postdoc and graduate schools. The overall objective of the call is to develop new knowledge that will contribute to the development of sustainable community building. The initiative also	http://www.formas.se/sv/Finansiering/Utlysningar/Hallbart-samhallsbyggande/

			aims to strengthen research and increase cooperation between academia, industry and society. The call covers a total of 211 million kronor over a five-year-period. The call will be open in September/October 2015 and close in February 2016. Decisions on funding are planned to be taken in June 2016.	
15	Formas-Communication project	Formas	Communication projects within Formas responsibilities. Due 2016-03-30 Principal applicant need not be a doctor.	www.formas.se
16	Formas-yearly conferencs-, symposia-, WS-support	Formas	Conferences, symposiums and workshops. Three calls per year with three dates. Contribution to the costs for the organisation of conferences and workshops (meetings). The application must contain: aim, prel. programs, Scientific Committee, invited speakers, number of participants, time, place and detailed budget. Meetings in Sweden are prioritised. Can be used for travel and accommodation for foreign participants, costs for meeting facilities and similar, not for salary costs. Principal applicant need not be a doctor.	www.formas.se
17	Open and directed calls	FORTE	Forte funds research for people's health, working life and welfare. Forte regularly conduct call for proposals in co-operation with other research funding agencies.	www.forte.se
18	Common	Geological Survey of Sweden (SGU)	The Geological Survey of Sweden, SGU, is the expert agency for issues relating to bedrock, soil and groundwater in Sweden. SGU provides support for geo-scientific research and targeted fundamental research at Swedish universities and colleges. The aim of the research is to meet the needs of society of applied geology and contribute to a sustainable development according g to an adopted research agenda for 2015-2020. In May every year, SGU is sending out information of the year's call to all interested universities and colleges. In Mid-September applications need to be submitted to SGU and the evaluation process begins. Decisions on funding are taken in January the following year.	www.sgu.se

19	No name	Helge Ax:son Johnson Foundation	The goal of the Foundation is to practice charity, to support the literary and artistic activities and to promote scientific research. Contribution to the pursuit of scientific research is assigned to both scientific institutions and to individual researchers for some of the application-specified research project. Financial support is preferably given to qualified graduate students and young scientists, and can only refer to less costly research tasks as well as to support teaching and study activities in the country. Application deadline is 1st February 2016 (same date every year).	www.haxsonj.se
20	No name	Knowledge Foundation (KK)	The Knowledge Foundation is the research financier for universities with the task of strengthening Sweden's competitiveness and ability to create value. The Knowledge Foundation strives to help Sweden's new universities create internationally competitive research environments, work long-term on strategic profiling and increase cooperation between academia, industry, institutes and society. Calls are based on 3-year-cycles; present period is 2016-2018 with different thematic calls both in spring and autumn every year.	http://www.kks.se/medel/Utlysningar/Startsida.aspx
21	No name	Knut and Alice Wallenberg Foundation	The Foundation's purpose is to "promote scientific research and teaching or study of beneficial use to the country". For project grants and for contributions to national critical infrastructures, the Foundation applies designated deadlines. Project applications must be registered with the Foundation no later than 1st February every year. The projects will normally be of basic scientific nature focused to a coherent scientific question. Applications of different direction than infrastructure can be submitted at any time during the year. The Governing Board meets normally four times a year and deals with applications as the evaluation is completed.	http://www.wallenberg.com/kaw/
22	No name	Lars Hiertas Minne	The Foundation accepts applications from non-profit associations or individuals. Grants can be given to specific social purposes as well as for public crafting and businesses. The Foundation also accepts proposals from individual researchers for projects in all subject areas. There is a yearly call open 15 August - 1 October. The decision of funding is announced in December.	http://www.larshiertasminne.se/ansokning /

23		Länsförsäk-ringar Alliance	The Foundation of Länsförsäkringar Alliance Research Fund supports research that is close to people's everyday security. The research is to contribute to increased economic and physical security in society. It is one of the components in the Länsförsäkringar Alliance involvement in the local community. If you represent qualified research environments or research groups tied to the Swedish universities, colleges or research institutes, you can apply for grants from the Research Fund.	http://www.lansforsakringar.se/stockholm/om-oss/forskning/sok-forskningsbidrag/
24		MISTRA	Mistra (the Swedish Foundation for Strategic Environmental Research) supports research of strategic importance for a good living environment and sustainable development. To pinpoint solutions to key environmental problems, Mistra funds research programmes in priority areas. Annually, ahead of new investments, Mistra issues about two calls for funding applications. The aim is that research of top scientific quality should be put to practical use in companies, public administration and NGOs. In this way, Mistra's investments are intended to foster sustainable development and boost Swedish competitiveness. A new call for Mistra Innovation will open 12th February 2016 and will close 8th April 2016.	http://www.mistra.org/utlysningar.html
25	Common	MSB, the Swedish Civil Contingencies Agency	Knowledge development plays a strategic role in MSB's work for a safer society. As research is the most important way of developing knowledge MSB has the task of directing, ordering and ensuring the quality of research conducted on its behalf. MSB primarily supports applied, needs-oriented research. The aim is to generate practical applicable research findings that will lead to an increased ability to solve societal problems. To stimulate research on civil contingencies MSB allocates approx. SEK 120 million annually to a variety of research activities, for example, funding for major research programmes, individual projects, and competence and structural support. During 2016 MSB is planning for multiple thematic calls. They are described in the MSB's research plan for 2016. Some will open during spring, others during the autumn.	www.msb.se/sv/Om-MSB/Forskning/Utlysningar/Pagaende-utlysningar/

26	Appropriation 2:4 Emergency Preparedness	MSB, the Swedish Civil Contingencies Agency	Under certain conditions and for a limited period, special funds may be granted to enhance the effect of society's overall emergency preparedness or the overall ability to manage crises. The Parliament therefore appropriate annually approximately SEK 1.1 billion to such efforts by certain funding, called "2:4 Emergency Prevention" that is managed by MSB. Next time for application for funds from appropriation 2:4 Emergency Preparedness is in September 2016.	https://www.msb.se/sv/Forebyggande/Krisberedskap/Anslag-24-Krisberedskap/Myndigheter/
27	Nordic Centres of Excellence: Advancing the bioeconomy transition in the Nordic region	Nordforsk	NordForsk primarily provides support to cover expenses associated with implementing collaboration between participants from the Nordic countries. Support from NordForsk comprises supplementary funding for cooperation between researchers who are already receiving grants from national or other research funders. Presently, there is a call for pre-proposals for Nordic Centres of Excellence: Advancing the bioeconomy transition in the Nordic region. This new two-phase call for proposals for Nordic Centres of Excellence is within the Nordic Bioeconomy Programme. The programme aims to fund three Nordic Centres of Excellence within a budget of NOK 90 million. Application deadline for the first phase is 16 March 2016.	http://www.nordforsk.org/en/funding
28	No name	Oscar and Lili Lamms Foundation	The Foundation of Oscar and Lili Lamm is to financially support scientific research for Swedish nature conservation, in particular problems linked to soil conservation, water conservation, landscape management and plant protection. Grants or scholarships may be sought for graduate student services, research, student theses and the arrangement of scientific symposia. The calls for proposals are thematic and the 2016 call will be directed on landscape management. The call is anticipated to open in April 2016.	www.stiftelsenlamm.a.se
29		Region Skånes miljövårdsfond	Region Skåne's distributes every year money from an environmental protection fund. The funding is for projects that nurture and develop the natural and cultural environment in southern Sweden and contributing to environmentally sustainable development, in accordance with the strategic program for the Region of Skåne. In 2015 the fund also contained earmarked money in support of climate actions. The next call will be open 15th Augusti – 15th September 2016.	http://utveckling.skane.se/utvecklingsomraden/miljo-och-klimat/region-skanes-miljovardsfond/

30	Common	Royal Swedish Academy of Sciences	The Royal Swedish Academy of Sciences is an independent organisation whose overall objective is to promote the sciences and strengthen their influence in society. Funds may be requested for general research in Earth Sciences and geography, and especially for the scientific nature of geographical research in the country, preferably in the Sarek mountain area. The next call opens in mid-October 2016 (for distribution of funds 2017).	www.kva.se
31	No name	Stiftelsen J. Gust. Richerts Minne	Scholarships from J. Gust. Richert Foundation are awarded yearly to promote research, education and training in the fields of environmental protection, energy, the built environment and transport technology. In 2015 SEK 6.1 million was distributed to 29 applications. The next call is open from 1st February 2016.	http://www.sweco.se/sv/Sweden/Om-Sweco/Priser-stipendier-och-sponsring/J-Gust-Richert-stiftelse/
32	Common	Swedish Agency for Economic and Regional Growth	The Swedish Agency for Economic and Regional Growth is a national government agency tasked with promoting entrepreneurship and regional growth. Current calls: Horizon2020 - Fast Track To Innovation (2016-10-25) Planning support and support to demonstration projects within "Demo Environment" (16-03-18) ,Regional Investment Support(16-12-31), and Regional support to the development of enterprises (16-12-31)	www.tillvaxtverket.se
33	No name	Swedish Association of Graduate Engineers - the Environmental Foundation	The Swedish Association of Graduate Engineers support environmental research, theses, studies, environmental information by their Foundation for the Environment. The Environmental Fund's purpose is to support and promote research, projects and studies aimed at improving the physical environment in Sweden and the neighborhood. Last day for application is 30th April 2016.	www.sverigesingenjorer.se
34	No name	Swedish Association of Local Authorities and Regions (SALAR)	The Swedish Association of Local Authorities and Regions, SALAR, is both an employers' organisation and an organisation that represents and advocates for local government in Sweden. All of Sweden's municipalities, county councils and regions are members of SALAR. SALAR is together with the Swedish Transport Administration, running a research program that is supported by a fund. The fund is for research of the design, use and management of the transport system. The cornerstone is community based research in both the short and long term. Presently, there are 7 prioritised areas of research.	http://skl.se/samhallsplaneringinfrastruktur/trafikinfrastruktur/forskningutveckling.294.html

35	Rural Develop-ment Program	Swedish Board of Agriculture	The Board of Agriculture is the Government's expert authority in matters of agri-food policy, and is responsible for the agricultural and horticultural sectors. The Rural development programme 2014-2020 consists of financial support and contributions that are designed to develop rural areas. Environment, sustainable development and innovation is a priority.	www.jordbruksverket.se
36	No name	Swedish Construction Industry's Development Fund (SBUF)	SBUF is the construction industry's organisation for research and development. SBUF's aim is to promote development in the building process in order to create more favorable conditions for constructions contractors by enabling them to benefit from research and conduct development work. SBUF has 7 meetings a year, three of which also deals with applications for grants for research projects. Dates are available at their website.	http://www.sbuf.se/Sok-bidrag/Ansokning-och-rapporteringstider
37	Common	Swedish Environmental Protection Agency	The Swedish Environmental Protection Agency (EPA) is funding research in support of the EPA's and the Agency for Marine and Water Management, with such as to reach the environmental objectives. The next calls are expected to open i May 2016.	www.naturvardsverket.se
38	No name	Swedish Farmers' Foundation for Agricultural Research (SLF)	The Swedish Farmers' Foundation for Agricultural Research is the Swedish agricultural industry's organisation for growing knowledge by funding research and development. The purpose of the foundation is to strengthen the competitive ability of the Swedish agricultural sector. The Foundation makes annual calls for applications for grants for R&D projects. Only research performed in Sweden is finances but the Swedish part of multinational projects can be financed by the foundation.	www.lantbruksforskning.se
29	Riksbankens jubileumsfond	Swedish Foundation for Humanities and Social Sciences (RJ)	The Swedish Foundation for Humanities and Social Sciences (RJ) is an independent foundation with the goal of promoting and supporting research in the humanities and social sciences. Grants for programmes, projects and infrastructure are announced once a year in coordinated application calls. Grants for research initiation, usually in the form of conferences and academic networks, may be applied for at any time. In addition, RJ provides focused inputs in research areas identified primarily by the foundation's 'sector committees'. The research system is supported by thematic, proactive inputs to supplement the researcher-initiated projects. This year's call closed 27th January 2016.	www.rj.se

40		Swedish Foundation for International Cooperation in Research and Higher Education (STINT)	The Swedish Foundation for International Cooperation in Research and Higher Education, STINT, was set up by the Swedish Government in 1994 with the mission to internationalise Swedish higher education and research. STINT offers a wide variety of grant and scholarship programmes to support internationalisation at Swedish educational establishments. STINT is currently inviting Swedish university leaders to apply for Strategic Grants. Applications should be submitted by the president of a Swedish university no later than 8th March 2016.	www.stint.se
41	No name	Swedish Foundation for Strategic Research (SSF)	The Swedish Foundation for Strategic Research (SSF) supports research in natural science, engineering and medicine that strengthens Sweden's competitiveness. SSF issues open calls for proposals for research grants, which are awarded in competition. In order for SSF to approve a research grant, the research should be scientifically excellent and commercially exploitable in Sweden. The research must lie within the areas prioritized by SSF. Presently, there is a call with SEK 400 million for "Industrial Research Centres" (IRC). Last day for proposals is 4th May 2016.	www.stratresearch.se
42	Common	Swedish National Space Board	The Space Agency is encouraging Swedish actors' participation in the EU framework program Horizon 2020 and therefore offers a planning grant for the costs associated with applications for any of the calls of the framework program. The applicant can be either partner or coordinator of the project and the project must have an adequate connection to space activities. Applications are processed on a continuing basis. Last opportunity to submit an application for a planning grant is eight weeks before the current Horizon 2020 call for proposals closes. Last day for application is 30th June 2016.	http://www.snsb.se/sv/Mediebank/Forskare/Utlysningar/
43	Common	Swedish Radiation Safety Authority (SSM)	Each year the Swedish Radiation Safety Authority (SSM) is funding research for about SEK 80 million. SSM is granted by the Government to conduct and support research. A purpose is that Sweden should develop a high national competence in the fields of nuclear safety, radiation protection and nuclear non-proliferation. Research should also be a scientific support in the Authority's supervisory work. In the beginning of each year the research needs are analyzed.	www.stralsakerhetsmyndigheten.se

44	Common	Swedish Research Council	The Swedish Research Council is an authority within the Ministry of Education and Research. The Swedish Research Council has a leading role in developing Swedish research of the highest scientific quality, thereby contributing to the development of society. The Swedish Research Council provides funding for basic research of the highest scientific quality in all disciplinary domains. Open calls are available at their website. Additional calls may also be launched in the course of 2016, for example at the request of the Swedish government. The Swedish Research Council is also involved in financing and long-term planning for national infrastructure and Sweden's participation in international infrastructures within all subject areas.	www.vr.se
45		Swedish Transport Administration	The Swedish Transport Administration supports research that contributes to the development of the transport system to satisfy the requirements and expectations of citizens and businesses, such as efficient and secure foundations of roads and railways. For a project to be considered for funding it has to connect to one of the target areas in the transport development plan. Any annual general open call is not advertised. Instead, special announcements are made when there is a need for such.	www.trafikverket.se
46	BIG	Swedish Transport Administration	Research programmes for efficient and secure foundations of roads and railways. (Priority research areas in 2014-2017.) The Transport administration together with the Royal Institute of technology, KTH, Chalmers University of technology, CTH, Luleå University of technology, LTU and SGI initiated the establishment of a long-term programme of research and innovation (R & I) in conjunction with the construction sector and other universities and research institutes. 10 year program with evaluation after 4 y.	www.trafikverket.se
47	No name	Swedish Waste Management Association	The Swedish Waste Management Association provides, through its concerted development effort, funding for development projects in the field of-waste management. Four million SEK is earmarked for the financing of projects in the priority areas 1) Prevention and reuse 2) consumer behavior 3) raw materials and marketing. Project size 100-800 thousand SEK. Smaller projects can be found running through the development efforts for incineration, landfill and biological treatment. Applications have	http://www.avfallsverige.se/rapporter/avfall-sverige-utveckling/

			to be submitted before 31st March 2016 and 30th September 2016.	
48	No name	Swedish Water & Wastewater Association - Development Unit (SVU)	Swedish Water Development (SVU) is the local authorities' own R&D program on municipal Water & Wastewater technology. The business is predominantly focused on applied research and development in the interest of Swedish Water members. There are also specific calls on prioritised areas. Currently two calls are open on Sustainable Community Building and on Waste water treatment in transitional areas. Application are to be submitted by 19th February 2016.	http://www.svensktvatten.se/
49	No name	Sven Tyrén Foundation	Tyréns is a consultancy company in the urban and rural planning sector that supports research by the Sven Tyrén Foundation. The R&D support of Tyréns is focused at four areas which are Climate, Environment and Health, Advanced contructions, Efficient Building Processes, Maintenance and renewability. By Sven Tyréns Foundation there is annual funding of a number of projects and doctoral students for development of the community building sector.	http://sventyrensstiftelse.se/
50	No name	Wenner-Gren Foundations	The Wenner-Gren Foundations (The Wenner-Gren Center Foundation for Scientific Research, The Axel Wenner-Gren Foundation for International Exchange of Scientists and The Foundation Wenner-Grenska Samfundet) support international scientific exchange for example by awarding fellowships to Swedish researchers or by arranging international symposia.	www.swgc.org
51	Common	Vinnova	Vinnova promotes sustainable growth by funding needs-driven research and stimulating collaborations between companies, universities, research institutes and the public sector. Vinnova also is the national contact agency for the EU framework programme for research and innovation. Their programmes and calls target actors in society who are important for Sweden's innovativeness. Some of the calls are open to international and bilateral collaborations. Vinnova develops a number of programmes and activities within strategic areas. Every year Vinnova invests about SEK 2.7 billion in various initiatives. All calls are available at the website. Some calls like the call **Building Innovation 2016-2018** is always open for application and decision takes place six times a year. The calls of **Challenge Driven innovation** close on the last Thursday of January and August each year. For more info, see: www.vinnova.se/cdi. **Innovations**	www.vinnova.se http://www.vinnova.se/sv/Ansoka-och-rapportera/Utlysningar/Effekta/Byginnovationen-2011-2016/ www.vinnova.se/cdi http://vinnova.se/sv/Var-verksamhet/Strategiskt-viktiga-kunskapsomrade

			for a sustainable society is a program that last between 2013 och 2016, and includes a number of calls (A call focused on environment and transport closes in March 2016).	n/Transport-och-miljo/Innovationer-for-ett-hallbart-samhalle/
52	VINNMER Marie Curie Academy. VINNMER Industry Outgoing. VINNMER Marie Curie Incoming.	Vinnova	"VINNMER Marie Curie Academy". Mobility aid for experienced researchers. 50% of the salary 1-3 years. "VINNMER Industry Outgoing". Mobility aid for experienced researchers. VINNMER Marie Curie Incoming."	www.vinnova.se
53	BioInnovation	Vinnova, Formas, Energimyndigheten	The strategic innovation agenda Bio Innovation Announces 32 million euros for projects that clearly address bio-based innovations in public funded activities. The purpose of the call is to stimulate innovations of new bio-based materials, products and services developed in collaboration with publicly-funded activities.	www.bioinnovation.se
54	No name	ÅForsk Foundation	The Foundation's purpose is to promote research and technological development, primarily in its purpose areas: Energy, Environment, Safety & Sustainability, Infrastructure, Materials, Processes and products from renewable sources. In 2015 the foundation awarded research grants totaling SEK 25 million. Application of research grants has to be submitted before 1st March 2016. Applications from young scientists with new and creative ideas are given priority.	www.aforsk.se

Below some international calls and/or funders:

No	Name	Funder	Description	web-site
International				
1	COST European cooperation in Science and Technology	COST	COST aims to enable breakthrough scientific developments leading to new concepts and products. It thereby contributes to strengthening Europe's research and innovation capacities. COST does NOT fund research itself, but supports networking by the means of different tools such as meetings, short term scientific missions, training schools and dissemination activities through COST Actions. Submission of COST Action proposal is possible at any time throughout the year. The next Collection Date is anticipated to be 23 February 2016.	http://www.cost.eu/participate/open_call www.cost.esf.org
2	Horizon 2020	European Commission	Funding between 2014-2020 by Horizon 2020 - research and innovation framework programme.	http://ec.europa.eu/research/participants/portal/desktop/en/home.html
3	Nordic Innovation	Nordic Innovation	Nordic Innovation is a Nordic institution working to promote cross-border trade and innovation. Working under the auspices of the Nordic Council of Ministers, Nordic Innovation is a key player in implementing the Nordic trade, industry and innovation partnership programme. The open call on the Nordic Built Cities Challenge will run until 31 October 2016, but is now closed for new entries. The ain is to support an open, multidisciplinary, needs-driven competition to develop and visualise Nordic innovative solutions for liveable, smart and sustainable cities.	www.nordicinnovation.org
4	BONUS Blue Baltic	BONUS	The Baltic Sea program for research and innovation, BONUS that focus on transnational research and development has now opened its third call "Blue Baltic". Blue Baltic is the biggest BONUS call so far and has a budget of 30 million euro and includes 11 thematic areas. The call is devoted to academic researchers, research institutes and to enterprises – the idea is that new innovative solutions to the environmental problems in the Baltic Sea can be developed and tested. The call will close 10 March 2016 and all projects must also be pre-registered on 9 February to submit a full proposal. Project start will be in early 2017 and stretch over three years. Contact in Sweden is Formas.	http://www.bonusportal.org/

5	Common	Nordic Project Fund (NOPEF)	The Nordic Project Fund Nopef, has a specific aim to strengthen the international competitiveness of Nordic enterprises by providing co-financing for feasibility studies that support export projects and the internationalisation of Nordic enterprises. Nopef finances feasibility studies within the fields of the environment, climate and green growth. The feasibility studies should contribute to direct or indirect environmental improvements and increased environmental consciousness in the project countries. Nopef may participate with up to 40% of the approved feasibility study costs in connection with international business set up.	http://www.nopef.com/pages/eng/front.php?lang=EN
6	WaterWorks 2015	Funders from 23 countries	The ERA-NET Cofund initiative WaterWorks2015, a collaboration of Water JPI and FACCE JPI, will set up a programme on sustainable water use in agriculture to increase water use efficiency and reduce soil and water pollution. This theme is common to the Strategic Research Agendas of the two collaborating JPIs. The call is expected to open on 16.2.2016 with a closing date for pre-proposals on 19.4.2016. Funders from 23 countries have allocated initial national call contributions of in total approximately 18 M€ from National funds plus 7.9 M€ EU top up will generate a call budget of in total over 26 M€.	http://www.waterjpi.eu/
7	Biodiversa	Funded under Horizon 2020 (ERA-NET COFUND scheme), the EU Research and Innovation programme.19 european states and 32 partners	Funding pan-European research on biodiversity and ecosystem services. Aims at one call per year.	www.biodiversa.org
8	FACCE-JPI	21 countries	FACCE-JPI provides and steers research to support sustainable agricultural production and economic growth, to contribute to a European bio-based economy, while maintaining and restoring ecosystem services under current and future climate change.	www.faccejpi.com
9	Advancing the bio-economy transition in the Nordic	Nordforsk	NordForsk launches a new two-phase call for proposals for Nordic Centres of Excellence within the Nordic Bioeconomy Programme. The programme aims to fund three Nordic Centres of Excellence within a budget of NOK 90 million.	http://www.nordforsk.org/en/funding

	region		Application deadline for the first phase is 16 March 2016.	
10	Smart Urban Futures	JPI Urban Europe: ERA-NET - 18 countries and 26 funders.	"Topic: •Concepts and strategies for smart urban transformation, growth and shrinkage, •New dynamics of public services, •Inclusive, vibrant and accessible urban communities. The call is addressed both to research institutes, universities, municipalities, businesses, nonprofit organizations, innovators and social entrepreneurs. Preliminary appl due 2016-03-15, Full application sept 20, 2016.	http://jpi-urbaneurope.eu/ensuf-call/
11	Water JPI	20 partners including Sweden.	Joint Call Management for providingand steering research and innovation in the water sector. Joint Call funded under WaterWorks2015	http://www.waterjpi.eu/
12	LIFE	EU	The LIFE programme is the EU's funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value. *The Natural Capital Financing Facility (NCFF)* is a new financial instrument which will provide financing opportunities in the form of loans or equity investments for revenue-generating or cost-saving pilot projects promoting the preservation of natural capital, including climate change adaptation projects *Private Finance for Energy Efficiency instruments (PF4EE)* is a new financial instrument which will provide loans for investments in energy efficiency projects prioritised by National Energy Efficiency Action Plan	http://ec.europa.eu/environment/life/
13	ESPON 2020 Cooperation Programme 2020	ESPON (Member States and ERDF)	The ESPON 2020 Programme aims at promoting and fostering a European territorial dimension in development and cooperation by providing evidence, knowledge transfer and policy learning to public authorities and other policy actors at all levels. On-going calls include 1) Applied research, 2) Targeted Analyses, 3) Scientific Platform 4) Transnational Networking Activities.	www.espon.eu

14	European Territorial Cooperation 2014-2020 (INTERREG V)	ERDF	Instruments to reach territorial cohesion by means of transnational and cross-border cooperation by linking research, innovation and regional development. Ongoing calls that Sweden participates in: Nord, Bothnia- Atlantic, Sweden-Norway, Central Baltic, South Baltic, Öresund-Kattegat-Skagerrak, Baltic Sea Region Programme, North Sea Programme and Northern Periphery Programme.	http://interreg.tillvaxtverket.se/

Annex VI: Workshop agenda and list of participants

INSPIRATION - HORIZON2020 CSA

INtegrated Spatial Planning, land use and soil management Research AcTION

www.inspiration-h2020.eu

Statens Geotekniska Institut och Forskningsrådet Formas bjuder in till:

INSPIRATIONs National Stakeholder Workshop

14 januari 2016

8.30-16.30

Sjöfartshuset Festvåningar – Skeppsbrorummet, våning 1
Skeppsbron 10
111 30 Stockholm

PROGRAM

Tid	Aktivitet
8.30-9.00	Kaffe/te och smörgås
9.00	Välkommen! Program och syfte med dagens WS
9.10	INSPIRATION: Introduktion till projektet
9.30	Presentation av resultaten från intervjuer och insamlade underlag:
10.00	Grupparbete 1 i formen ”World Cafe”[39] - Vi förflyttar oss mellan tre temabord och diskuterar de presenterade resultaten, vad vi vill tillföra/ändra och eventuella prioriteringar.
11.00	Presentation och diskussion av resultatet från World Café-övningen
12:20	LUNCH
13:20	Grupparbete 2 - Syntes och slutförande av input till den nationella rapporten
14.30	Kaffe/te
14.50	Fortsättning, grupparbete 2
15.30	Presentation och summering av grupparbete 2, möjlighet för sista justeringar av respektive syntesen av respektive tema
Ca 16.30	Avslut
16.45	Mingel, dricka och tilltugg på Statens Geotekniska Institut, Kornhamnstorg 61 (gångavstånd)

De Teman som behandlas under dagen är:

Tema a: Strategisk FoI-agenda

Tema b: Forskning – implementering

Tema c: Finansieringslandskapet

[39] För beskrivning se t.ex. **https://en.wikipedia.org/wiki/World_Café_(conversational_process)**

List of participants

Name	Organisation
Anna Yman	SWECO
Charlotte Cederbom	Swedish Geotechnical Institute
Dan Berggren-Kleja	Swedish Agricultural University
David Bendz	Swedish Geotechnical Institute
Elisabet Göransson	The Swedish Research Council, FORMAS
Göran Risberg	Geological Survey of Sweden
Hjördis Löfroth	Swedish Geotechnical Institute
Johan Skarendahl	the Swedish Centre for Innovation and Quality in the Built Environment (IQ samhällsbyggnad)
Karin Willis	Stockholm county adm board
Klas Köhler	Repr of all Sw County Adm boards on behalf of EPA
Lisa Granelli	The Swedish Research Council, FORMAS
Lisa van Well	Swedish Geotechnical Institute
Marianne Lilliesköld	Swedish Environmental Protection Agency
Marlene Ågerstrand	Department of Environmental Science and Analytical Chemistry (ACES)
Mats Tysklind	Umeå University
Ruben Aronsson	SBUF (the construction industry's organisation for research and development)
Sebastian Axelsson	Vinnova
Yvonne Ohlsson	Swedish Geotechnical Institute

16. Switzerland

Report by Regula Brassel, Marco Pütz

16.1 Executive summary

16.1.1 English version

INSPIRATION is a European research project within the research program Horizon 2020. The project aims at building up a strategic research agenda in the fields of spatial planning, land use and soil management. Furthermore, models to implement the research agenda are to be designed and a network of funding institutions is to be built up.

In 17 European countries, interviews and workshops with selected key stakeholders have been conducted. In the following chapters, an overview of the results of the Swiss interviews and workshop are presented.

Societal challenges

In the Swiss interviews and workshop, nine topics have been discussed that identify societal challenges in the fields of spatial planning, land use and soil management. However, finding joint solutions and compromises has been singled out as a superordinate challenge, because of the great influence it has on the handling of the other societal challenges.

- Finding joint solutions and compromises
- Finding sites for renewable energy
- Handling the impacts of climate change
- Finding solutions to the impacts of demographic change onto space and bridging gaps between population groups
- Finding ways to foster high-density housing and to prevent urban sprawl
- Protecting and enhancing the quantity and the quality of ecosystems, woods, the agricultural land and soils
- Protecting the landscape and enhancing its quality
- Creating a sustainable overall traffic
- Decoupling prosperity, economic growth and demand for land

Strategic research agenda Switzerland

In Switzerland 74 specific research topics have been compiled from the interview and workshop data, revealing research needs and knowledge gaps in the fields of spatial planning, land use and soil management. The research topics were organised along five research fields and cover a broad range of different research questions in jurisprudence, natural sciences and social sciences:

Within the research field **“Legal Framework”**, research needs are identified, concerning the Swiss zone concept (agricultural zone, building zone) and the rural land rights. Furthermore, research is needed, on how environmental qualities may be integrated into the land rights of the residential areas. Potentials to review the right of ownership in order to facilitate compact building are also to be explored.

The research field **“Spatial planning and development”** focuses on planning issues and on the land as a resource. One research need in this field is to develop visions for spatial

planning that show how the situation *should be like* in the future. Furthermore, research is needed on how the multifunctionality of space might be preserved, on how the implementation and acceptance of inner development in residential areas could be enhanced and on the organisation of mobility and transport in Switzerland. Other knowledge gaps have been identified in the fields of soil protection, landscape protection and the protection of cultivated land. The Swiss key stakeholders thereby focused particularly on planning instruments and steering measures that should be developed as well as on landscape-development goals and landscape protection sites that need to be defined. To tackle challenges in the mountain regions (emigration, effects of climate change in mountain regions, tourism, supply and infrastructure) also new knowledge and new approaches are needed. In the geological underground, instruments to weigh up underground land-use claims are missing. Additionally, new sites to mine gravel, sand and other geological raw materials in Switzerland are to be found, because the known deposits are either depleted or blocked by conflicting uses. Moreover, research is needed to find new sites for alternative energies. The effects of demographic change, social trends and lifestyle onto space as well as the spatial effects of economic drivers and political and economic interests have been mentioned as further important research needs.

In the research field **"Soil, sediment and water"**, research needs on biodiversity and soil biology are identified. Other important research needs within this research field are a better understanding of the material flows in the soil and the impact of stress factors on ecosystems. Furthermore numerous research topics on agricultural land management have been formulated.

Within the research field **"Data and harmonisation"**, missing data and unharmonised data in the fields of soil, sediment and ecosystem are discussed.

The research field **"Implementation and awareness-raising activities"** focuses on research needs dealing with weighing up interests, solving conflicting uses and the design of knowledge transfer and cooperation. Besides, in this research field, missing knowledge on the concrete implementation of visions and targets and on the management of long-term spatial planning projects is discussed. Finally, further research is needed that show how the awareness of different population groups on sustainability issues and on concerns of other population groups could be enhanced.

Science-policy-interface

In several sectors, knowledge transfer between science and policy/practice is working well in Switzerland. However, in the fields of surface water, geological underground and spatial planning knowledge transfer is viewed as insufficient.

To improve knowledge transfer, the interviewees stressed that scientific knowledge cannot just be disseminated, but has to be processed and brought down to an applicable level and transformed into an easily understandable language. A person particularly responsible for communication and knowledge transfer within research projects can help to improve this process. Public-private-partnerships as well as transdisciplinary approaches are also viewed as options to improve knowledge transfer.

Funding options

In Switzerland a multitude of different institutions exist that fund scientific projects in the fields of spatial planning, land use and soil management. In the interviews and the workshop the Swiss National Science Foundation, diverse other foundations, networks, societies, NGOs and commercial companies have been named, but also Federal offices and cantonal administrations.

16.1.2 Deutsche Version

INSPIRATION ist ein europäisches Forschungsprojekt innerhalb des Forschungsprogramms Horizon 2020. Das Ziel des Projekts ist es, eine strategische Forschungsagenda zu den Themen Raumplanung, Landnutzung und Bodenmanagement aufzubauen und aufzuzeigen, wie diese Forschungsagenda umgesetzt und finanziert werden kann.

In 17 europäischen Ländern wurden hierzu Interviews und Workshops mit ausgewählten Experten durchgeführt. Die Resultate der Befragung und des Workshops in der Schweiz sind in den folgenden Kapiteln zusammengestellt.

Gesellschaftliche Herausforderungen

In den Interviews und dem Workshop in der Schweiz wurden insgesamt neun Themenbereiche diskutiert, die gesellschaftliche Herausforderungen in der Raumplanung, der Landnutzung und dem Bodenmanagement aufzeigen. Das Finden von gemeinsamen Lösungen und Kompromissen wurde dabei als übergeordnetes Thema bezeichnet, da es den Umgang mit den übrigen Herausforderungen stark beeinflusst.

- Finden von gemeinsamen Lösungen und Kompromissen
- Finden von Standorten für erneuerbare Energien
- Finden von Lösungen, um mit den Auswirkungen des Klimawandels umzugehen
- Finden von Lösungen, um mit der Wirkung des demografischen Wandels auf den Raum umzugehen und Überbrücken von Gräben zwischen Bevölkerungsgruppen
- Finden von Möglichkeiten, um verdichtetes Bauen zu fördern und der Zersiedelung entgegen zu wirken
- Schützen und Erhöhen der Qualität von Ökosystemen, Wäldern, landwirtschaftlichem Land und Böden; Erhalten dieser Flächen (Quantität)
- Schützen der Landschaft und Erhöhen der Landschaftsqualität
- Schaffen eines nachhaltigen Gesamtverkehrs
- Entkoppeln von Wohlstand, ökonomischem Wachstum und Bodenverbrauch

Strategische Forschungsagenda Schweiz

Aus den Resultaten der Interviews und des Workshops in der Schweiz konnten 74 spezifische Forschungsthemen erarbeitet werden, die Wissenslücken und Forschungsbedarf in der Raumplanung, der Landnutzung und dem Bodenmanagement aufzeigen. Die Forschungsthemen sind in fünf Forschungsbereiche gegliedert und decken eine breite Palette verschiedenster rechts-, natur- und sozialwissenschaftlicher Fragestellungen ab:

Im Forschungsbereich **„Rechtliche Grundlagen“** wird Forschungsbedarf zum Zonenkonzept und dem bäuerlichen Bodenrecht in der Schweiz formuliert sowie zur Frage, wie Umweltqualitäten in das Bodenrecht der Siedlungsgebiete eingebunden werden können. Weiterer Forschungsbedarf besteht im Eigentumsrecht. Dabei steht die Frage nach möglichen Anpassungen des Eigentumsrechts im Zentrum, die die Umsetzung verdichteten Bauens erleichtern könnten.

Der Forschungsbereich **„Räumliche Planung und Entwicklung“** befasst sich mit raumplanerischen Fragestellungen und dem Boden als nutzbarer Fläche, beziehungsweise geologischer Ressource. Als wichtiger Forschungsbedarf wurde die Erarbeitung von Visionen der Raumplanung genannt. Es reicht nicht aufzuzeigen, wie sich der Raum zukünftig entwickeln könnte – es werden Visionen benötigt, die festlegen, wie der Raum in Zukunft *gestaltet sein soll*. Des Weiteren wird Forschung zum Erhalt der Multifunktionalität des Raumes, zur Gestaltung von Verkehr und Mobilität in der Schweiz sowie zur Umsetzung und Akzeptanz baulicher Innenentwicklung gefordert. Wissenslücken wurden aber auch im Bodenschutz, im Kulturlandschutz sowie im Landschaftsschutz und in der Landschaftsentwicklung identifiziert. Dabei wurde insbesondere Fokus auf das Fehlen von geeigneten Planungsinstrumenten und Steuerungsmassnahmen gelegt sowie auf die ungenügende Definition von landschaftlichen Schutzgütern und Entwicklungszielen. Um die Herausforderungen in den Berggebieten angehen zu können (Abwanderung, Wirkung des Klimawandels auf die Berggebiete, Tourismus, Versorgung) werden ebenfalls neue Ansätze und neues Wissen benötigt. Im Bereich des geologischen Untergrunds fehlen Instrumente zur Abwägung von Nutzungsansprüchen. Zudem muss nach neuen Vorkommen von Kies, Sand und weiteren geologischen Rohstoffen in der Schweiz gesucht werden, da die vorhandenen Ressourcen erschöpft oder durch Nutzungskonflikte blockiert sind. Für die Suche nach Standorten für erneuerbare Energien wird ebenfalls eine wissenschaftliche Auseinandersetzung mit dem Thema gefordert. Die Wirkung des demografischen Wandels, sozialer Trends und Lifestyle auf den Raum, wie auch die räumliche Wirkung ökonomischer Treiber sowie politischer und ökonomischer Interessen, wurden ebenfalls als wichtiger Forschungsbedarf genannt.

Im Forschungsbereich **„Boden, Sediment und Wasser“** wird einerseits Forschungsbedarf zu Biodiversität und Bodenbiologie formuliert. Andererseits wird das bessere Verständnis der Stoffflüsse im Boden sowie die Wirkung von Stressfaktoren auf Ökosysteme als wichtiger Forschungsbedarf identifiziert. Zahlreiche der genannten Forschungsthemen betreffen zudem das landwirtschaftliche Bodenmanagement.

Fehlende Datensätze in den Bereichen Boden, Ökosystem und Sedimente sowie die Harmonisierung von Daten werden im Forschungsbereich **„Daten und Harmonisierung“** diskutiert.

Im Forschungsbereich **„Umsetzung und Sensibilisierung“** wird Forschungsbedarf zu Interessensabwägungen und der Lösung von Nutzungskonflikten identifiziert, sowie zur Gestaltung von Wissenstransfer und Zusammenarbeit. Zudem fehlt Wissen, wie Zielbilder und Vorgaben konkret umgesetzt werden können und wie langfristige Raumplanungsprojekte optimal gleitet werden. Schliesslich wird weitere Forschung benötigt, die zeigt, wie verschiedene Bevölkerungsgruppen für Nachhaltigkeitsthemen sowie für Anliegen anderer Bevölkerungsgruppen sensibilisiert werden können.

Verknüpfung von Wissenschaft und Praxis

Der Wissenstransfer zwischen Wissenschaft und Praxis in der Schweiz funktioniert in gewissen Sektoren gut – in den Bereichen Oberflächengewässer, geologischer Untergrund und Raumplanung wird er jedoch als ungenügend betrachtet.

Zur Verbesserung von Wissenstransfer wurde in den Interviews die Aufbereitung von Wissen als zentraler Punkt genannt. Wissenschaftliches Wissen muss auf eine anwendbare Ebene transferiert und in einfacher Sprache vermittelt werden, damit es die Praxis erreicht. Personen innerhalb von Forschungsprojekten, die speziell für Kommunikation und Wissenstransfer verantwortlich sind, können diesen Prozess erleichtern. Public-private-partnerships sowie transdisziplinäre Ansätze werden ebenfalls als Möglichkeiten gesehen, den Wissenstransfer zu verbessern.

Finanzierungsmöglichkeiten

In der Schweiz existiert eine Vielzahl verschiedener Institutionen, die wissenschaftliche Projekte in den Bereichen Raumplanung, Landnutzung und Bodenmanagement finanzieren. In den Interviews und dem Workshop wurden der Schweizerische Nationalfonds, verschiedene Stiftungen, Netzwerke, Verbände, NGOs und kommerzielle Firmen genannt, aber auch Bundesämter und kantonale Stellen.

16.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5 - Switzerland) presents the reviewed and synthesised information collated for Switzerland. The information has been collated in accordance with INSPIRATION D2.3 “Template for national information collation”. From August 2015 till mid of January 2016, the NFP Switzerland conducted 20 interviews with 23 NKS and recorded them in writing. Details on these NKS are provided in Annex I. In a next step, the results of the interviews have been analysed by coding them according to the questions of the questionnaire and according to their content. To grasp all of the relevant information, a code system of more than 100 codes and subcodes has been developed. The desk study was mainly based on documents suggested by the NKS. However, it has been extended by further important documents. All documents of the deskwork are listed in Annex II. In the INSPIRATION-Workshop Switzerland, which has been hold on Friday, 13th of November at the ETH Zurich, the data from the interviews has been reviewed and complemented interactively with 13 stakeholders. Details on the workshop participants are provided in Annex I. In deliverable 2.5 we give a synthesised overview on the results from the interviews and the workshop in Switzerland.

16.3 Research and Innovation (R&I) needs

16.3.1 Societal challenges and needs

In the Swiss interviews and the workshop a broad variety of different societal challenges were named. We grouped them thematically and ended up with nine topics, which describe the societal challenges Switzerland is facing today in the fields of spatial planning, land use and soil management. However, finding joint solutions is viewed as a superordinate topic, because it has great influence on the handling of the other societal challenges.

- **Joint solutions:** Finding joint solutions and compromises in spatial planning, land use and soil management; solving conflicting use.
- **Renewable energy:** Implementing nuclear phase-out and finding sites for renewable energy.
- **Climate change:** Handling the impacts of climate change onto ecosystems and the agricultural production.
- **Demographic change:** Finding solutions to the impacts of demographic change onto space and bridging gaps between population groups, e.g. the views of people from the country and people from the city.
- **Constructional change:** Finding ways to foster high-density housing and to prevent urban sprawl; finding ways to deal with abandoned buildings.
- **Protecting and enhancing the quantity and the quality of ecosystems, woods, the agricultural land and soils:** Protecting ecosystems, woods, the agricultural land and soils from degradation and constructional sealing; enhancing and developing their quality; preserving food security on a global scale and the multifunctionality of the land.
- **Protecting the landscape and enhancing its quality:** Enhancing the quality, protecting and developing the landscape - especially its visual aspects; preserving its heterogeneity; finding ways to deal with alpine emigration zones and the upcoming of trees.
- **Sustainable overall traffic:** Integrating individual motor car traffic, public transport and non-motorised traffic into the overall traffic.
- **Linkage between prosperity, economic growth and demand for land:** Decoupling prosperity, economic growth and demand for land, e.g. by constructing higher buildings.

16.3.2 Topics / research needs to include in the SRA

In the following we first list existing research programmes and research agendas in Switzerland that formulate research questions in the fields of spatial planning, land use and soil management. After that, we present the Strategic Research Agenda Switzerland, which comprises the research needs and knowledge gaps named in the interviews and during the workshop.

National Research Programmes of the Swiss National Science Foundation

The National Research Programmes (NRPs) of the Swiss National Science Foundation (SNSF) are a funding instrument aiming to solve the most urgent societal problems in Switzerland (for more on the funding schemes of the SNSF, see Chapter *16.5.1 Funding schemes and possibilities for research funding*). Each NRP is dedicated to a specific problem, addressing pressing societal, political and economic issues. New topics for NRPs can be proposed every two to three years to the State Secretariat for Education, Research and Innovation (SERI) by Swiss Federal Offices, research institutes, research groups, other institutions or individuals. The final decision on NRP topics lies with the Swiss Federal Council (Swiss National Science Foundation (SNSF), 2011; Swiss National Science Foundation (SNSF), 2015c).

Running NRPs in the fields of spatial planning, land use and soil management

- NRP 70 "Energy Turnaround"
- NRP 69 "Healthy Nutrition and Sustainable Food Production"
- NRP 68 "Sustainable Use of Soil as a Resource"
- NRP 66 "Resource Wood"
- NRP 65 "New Urban Quality"

Concluded NRPs in the fields of spatial planning, land use and soil management

- NRP 61 "Sustainable Water Management"
- NRP 54 "Sustainable Development of the Built Environment"
- NRP 48 "Landscapes and Habitats of the Alps"
- NRP 41 "Transport and Environment: Interactions Switzerland / Europe"

  (Swiss National Science Foundation (SNSF), 2015c)

Research agendas by Federal Offices and other Swiss institutions related to the scope of INSPIRATION

- *Forschungskonzept Land- und Ernährungswirtschaft 2013-2016:* (Bundesamt für Landwirtschaft (BLW), 2012) Research concept on agriculture and nutrition economy of the Federal Office for Agriculture (FOAG)
- *Forschungskonzept Nachhaltige Raumentwicklung und Mobilität 2013-2016:* (Bundesamt für Raumentwicklung (ARE), 2012) Research concept on sustainable spatial development and mobility of the Federal Office for Spatial Development (ARE)
- *Forschungskonzept Nachhaltiger Verkehr 2013-2016:* (Bundesamt für Strasse (ASTRA) & Bundesamt für Verkehr (BAV), 2012) Research concept on sustainable transport of the Federal Office of Transport (FOT) and the Federal Roads Office (FEDRO)
- *Forschungskonzept Umwelt für die Jahre 2013-2016. Schwerpunkte, Forschungsbereiche und prioritäre Forschungsthemen:* (Miranda; Jacquat et al.,

2012) Master plan on environmental research of the Federal Office for the Environment (FOEN)

- *Wohnforschung 2012-2015. Forschungsprogramm des Bundesamtes für Wohnungswesen:* (Bundesamt für Wohnungswesen (BWO), 2012) Research programme on habitation of the Federal Office of habitation (BWO)
- *Arbeitsprogramm Agroscope 2014-2017:* (Agroscope, 2014) Work plan of Agroscope (Swiss centre of excellence for agricultural research)
- *Herausforderungen der Landschaftsentwicklung - Aktuelle Forschungstrends und zukünftiger Forschungsbedarf in der Schweiz:* (Degenhardt & Hunziker, 2011) Research agenda on landscape development
- *Bodenkartierung Schweiz. Entwicklung und Ausblick:* (Borer & Knecht, 2014) Developments and perspectives in Swiss soil mapping, including the formulation of research fields
- *Schwerpunkte der Eawag-Forschung von 2013 bis 2016:* (EAWAG, 2011) Focus areas EAWAG, Swiss Federal Institute of Aquatic Science and Technology
- *Themenspeicher:* (Forum Früherkennung Biodiversiät und Landschaft, 2011) Collection of topics in the fields of biodiversity and landscape that will be relevant in the future
- *Strategie Antibiotikaresistenzen Schweiz:* (Schweizerischer Bundesrat, 2015) Swiss strategy on antibiotic resistance, including the formulation of research topics on antibiotics in ecosystems
- *Kompetenzzentrum Boden: Servicestelle für Kantone und Bund:* (Keller; Meuli et al., 2014) Collection of tasks a „Soil Competence Centre“ (not yet existing) could be responsible for, including fields where further research is needed

Strategic research agenda Switzerland

Research field 1: Legal framework

CH 1.1: Zone concept and rural land rights

Relevance of the issue and justification of the need for research:

In Switzerland, land in the agricultural zone has long ceased to be used solely for farming purposes. Such land is being built on (e.g. high-voltage lines, conversions of agricultural buildings into dwellings), it includes ecologically protected areas, special-use areas (e.g. landfill sites) and also agricultural superstructure works. Some 25% of all buildings in Switzerland are constructed outside of the building zone, which strongly questions the concept of separating between agricultural land and building areas. Moreover, there is a discrepancy between the Federal Act on Rural Land Rights (Bundesgesetz über das bäuerliche Bodenrecht, BGBB), under which only farmers are allowed to acquire farmland, and the actual highly diverse use of such land. In this context it may also be questioned, if it still shall be possible in future to inherit agricultural land by non-farmers, as it is possible today.

Specific research topics and knowledge gaps:

Land management

- **Develop a new zone concept:** Develop new spatial planning concepts which could replace the concept of agricultural zone and building zone and provide a more faithful reflection of the current situation (e.g. by introducing a cultivated land zone).
- **Update the rural land rights and the inheritance law:** Develop new legal solutions that could supplement or replace the rural land rights, and take better account of the diverse use of farmland. Reconsider who shall be allowed to inherit agricultural land in the future.

Documents:

- *Bauen ausserhalb der Bauzonen: Fehlanreize im Nichtbaugebiet - eine Übersicht. Schlussbericht vom 27.07.2015:* (Institut für Wirtschaftsstudien Basel, 2015)
- *Website on the Project Raum+:* (ETH Zurich, 2015)
- *Umweltrecht in der Praxis*: Journal of the Association for Environmental Law
- *INFORAUM and Raum & Umwelt:* Journals of VLP-ASPAN, Swiss Association for Spatial Planning

Stakeholders:

- NGO, network, workshop participants

CH 1.2: Environmental qualities and land rights of the residential areas

Relevance of the issue and justification of the need for research:

To a certain extent, the environmental qualities of land and soil are included in the Swiss rural land rights. This is not the case for the land rights of the residential areas. However, it is essential that the land in residential areas is not accorded a purely economic character. Unfortunately, researchers in environmental law that deal with this land issue are missing in Switzerland.

Specific research topics and knowledge gaps:

Land management

- **Integrate environmental qualities in the land rights of residential areas:** Show how environmental qualities can be integrated into the land rights of residential areas, so that the land there is not accorded a purely economic character.

Stakeholders:

- Network, SME/consultant, others, workshop participants

CH 1.3: Right of ownership

Relevance of the issue and justification of the need for research:

The right of ownership is very deeply entrenched in Swiss law. At the same time, the new Spatial Planning Act (Raumplanungsgesetz, RPG) demands for internal development and compact building. The internal development of residential areas poses a daunting challenge because often solutions have to be sought in consultation with many private landowners, which may block the project.

Specific research topics and knowledge gaps:

Land management

- **Reconsider the right of ownership:** Show how the right of ownership in Switzerland could be reviewed, ensuring the feasibility of the mission set out by the Spatial Planning Act when it comes to compact building and internal development.

Stakeholders:

- Network, SME/consultant, national/regional/local authority, others, workshop participants

Research field 2: Spatial planning and development

CH 2.1: Visions for spatial development

Relevance of the issue and justification of the need for research:

Until now, scenarios have been designed that show how the use of land will develop in future and how Swiss spatial planning could react to these developments. However, this is not enough – visions for what the future situation *should be like* are needed to be able to actively influence future developments. The Swiss Concept of spatial Planning (Raumkonzept Schweiz) already takes this line but must now be developed further.

Specific research topics and knowledge gaps:

Demand

- **Develop visions for spatial planning:** Develop visions of how land in Switzerland is to be used in future, how cities and municipalities are to be planned, how the landscape in Switzerland is to be developed, and how mobility in the country is to be refined.

Land management

- **Develop visions for spatial planning:** Develop visions of how land in Switzerland is to be used in future, how cities and municipalities are to be planned, how the landscape in Switzerland is to be developed, and how mobility in the country is to be refined.

Documents:

- *Raumkonzept Schweiz. Überarbeitete Fassung:* (Schweizerischer Bundesrat; Konferenz der Kantonsregierungen (KdK) et al., 2012)
- *Die Schweiz - ein städtebauliches Portrait:* (Diener; Herzog et al., 2006)

Stakeholders:

- National/regional/local authority, network, NGO, workshop participants

CH 2.2: Multifunctionality of space

Relevance of the issue and justification of the need for research:

It is important to preserve the multifunctionality of land and space. Agricultural land shall not only produce products, but also be a habitat for diverse species. However, biodiversity is not only to be found in protection areas and on agricultural land, but also within settlements. To be attractive, settlement areas and agglomerations also have to satisfy a multitude of different needs.

Specific research topics and knowledge gaps:

Land management

- **Multifunctionality of agricultural land:** Find ways to preserve the multifunctionality of agricultural land (production, biodiversity etc.).
- **Multifunctionality of agglomerations and settlement areas:** Find ways to preserve the multifunctionality of agglomerations and settlement areas (habitation, recreation, green space or agricultural areas, biodiversity etc.).

Stakeholders:

- National/regional/local authority, workshop participants

CH 2.3: Inner development of residential areas

Relevance of the issue and justification of the need for research:

Inner development and compact building are laid down as requirements in the new Spatial Planning Act. However, compact building must not damage the quality of life of inhabitants. Dense residential areas must therefore be well designed and should include attractive open spaces and recreation areas. Many inhabitants have a "not in my backyard" mentality. This makes research on the acceptance of compact building very important. Moreover, the question arises which residential areas shall still be allowed to grow outwards and which shall be slated for internal development only. In this field research on burden sharing is needed. The concrete implementation of compact building also poses a challenge.

Specific research topics and knowledge gaps:

Land management

- **Inner development and preservation of the quality of life:** Show how a residential area can be developed internally without reducing the quality of life of the inhabitants.
- **Acceptance of compact building:** Understand why the acceptance of compact building is higher in certain areas and where those areas are. Show how compact building must be planned so as to be accepted by the population.
- **Decision criteria for inner development:** Define decision criteria which help to decide where compact building is and where it is not to take place. Show how to decide fairly which residential areas have to limit themselves to inner development in the future (developing approaches on burden sharing).
- **Implementation of inner development:** Develop instruments and examples that demonstrate how compact building can be carried out. Municipalities and cantons lack information on how particularly rural detached-housing areas can be densified. Better support for municipalities and cantons, rather than research, is needed here.

Documents:

- *Website of New Urban Quality, National Research Programme NRP 65 (running):* (Swiss National Science Foundation (SNSF), 2015b)
- *Gesundheit fördern, Landschaft gestalten. Gesundheitsressource Landschaft: Wie sich in Gemeinde-, Stadt- und Quartierentwicklungen dieses Potenzial nutzen lässt:* (Stiftung Landschaftsschutz Schweiz & naturaqua PBK, 2015)
- *Website on Pilot Programmes Sustainable Spatial Development (Modellvorhaben Nachhaltige Raumentwicklung):* (Bundesamt für Raumentwicklung (ARE), 2015)
- *Modellvorhaben Nachhaltige Raumentwicklung: Nutzungspotentiale für eine Siedlungsentwicklung nach innen:* (Bundesamt für Raumentwicklung (ARE), 2013)
- *Bundesgesetz über die Raumplanung (Raumplanungsgesetz, RPG) vom 22. Juni 1979 (Stand am 1. Mai 2014):* (Bundesversammlung der Schweizerischen Eidgenossenschaft, 2014)
- *Website on the Project Raum+:* (ETH Zurich, 2015)

Stakeholders:

- network, national/regional/local authority, NGO, business/industry, workshop participants

CH 2.4: Transport and mobility

Relevance of the issue and justification of the need for research:

The Swiss Plateau will be one big conurbation by 2050. To function properly, this conurbation will need appropriate infrastructure. In the future, Swiss roads will be characterised by self-driving vehicles, which will transform mobility completely. It is vital to think about such future developments already and to plan accordingly. Required transport developments such as bicycling, however, should also be promoted.

Specific research topics and knowledge gaps:

Land management

- **Design the future development of transport:** Develop concepts showing how transport can be tailored to the developments of compact building and how automated vehicles can be integrated into the overall traffic. Research and also new planning instruments are needed for this purpose.
- **Make bicycle lanes more attractive:** Show how bicycle lanes can be made more attractive.

Documents:

- *Der grosse Plan und seine helvetische Realisierung. Die Gesamtverkehrskonzeption 1972-1977 und ihre Wirkung auf die schweizerische Verkehrspolitik:* (Haefeli, 2006)

Stakeholders:

- Network, national/regional/local authority, business/industry, workshop participants

CH 2.5: Soil protection

Relevance of the issue and justification of the need for research:

Today in Switzerland a soil strategy is missing that defines how soils are to be used. Also missing are spatial planning instruments that integrate soil functions and therefore consider the quality of soils. Both aspects, however, are very important to make sound spatial planning decisions. In order to show better the high value soils have, economic valorisation of soil functions could be a solution where further research is needed. Moreover, there are no quality-assurance standards for soil-protection projects.

Specific research topics and knowledge gaps:

Land management

- **Missing soil strategy:** Develop a strategy on the use of soils, considering soil properties and their location.
- **Spatial planning instruments considering soil functions:** Develop spatial planning instruments that integrate the qualities of soils. Develop models to show the spatial distribution of soil functions in Switzerland. To this end, methods must be devised to reliably translate soil properties into soil functions.
- **Acceptance of spatial planning instruments considering soil qualities:** Show how to enhance the acceptance of spatial planning instruments considering the qualities of the soil by land owners, constructors, spatial planners and communalities.
- **Economic valorisation of soil functions and multifunctionality:** Develop methods to monetarise soil functions and the multifunctionality of the soil.
- **Quality assurance in soil-protection projects:** Develop standards for quality assurance in soil-protection projects that reveal the effectiveness of such projects and thus demonstrate whether the available implementation guidelines are sufficient.

Documents:

- *Website of "Sustainable Use of Soil as a Resource", National Research Programme NRP 68 (running):* e.g. Felix Walter, Policy Instruments for Sustainable Soil and Land Use Management (Swiss National Science Foundation (SNSF), 2015a)

Stakeholders:

- SME/consultant, network, university/research institute, others, workshop participants

CH 2.6: Protection of cultivated land

Relevance of the issue and justification of the need for research:

Cultivated land is under pressure in Switzerland. While the best cultivated land is preserved by the Sectoral Plan for Cropland Protection (Sachplan Fruchtfolgeflächen), other cultivated areas are built over. In addition to construction on cultivated land in the building zone, a great deal of cultivated land is lost in the agricultural zone to agricultural structures (e.g. animal mast facilities, refrigeration buildings). The agricultural zone has turned into the "building zone" of farmers.

Specific research topics and knowledge gaps:

Land management

- **Steering measures to limit building development on cultivated land:** Develop economic concepts that will help preserve cultivated land in the long term. Develop approaches that pass the social costs for the loss of land to construction to the party responsible. Develop support measures and economic incentives for farmers to prevent them building agricultural structures on agricultural land.

Documents:

- *Sachplan Fruchtfolgeflächen (FFF), Festsetzung des Mindestumfangs der Fruchtfolgeflächen und deren Aufteilung auf die Kantone:* (Eidgenössisches Justiz und Polizeidepartement (EJPD); Bundesamt für Raumplanung (BRP) et al., 1992)
- *Weissbuch Landwirtschaft Schweiz: Analysen und Vorschläge zur Reform der Agrarpolitik, 2., korrigierte Auflage:* (Bosshard; Schläpfer et al., 2011)
- *Press releases of the Swiss Foundation for Landscape Conservation*

Stakeholders:

- National/regional/local authority, NGO, SME/consultant

CH 2.7: Landscape protection and development

Relevance of the issue and justification of the need for research:

The European Landscape Convention entered into force in Switzerland in 2013. As a result, Switzerland is required to improve its knowledge of its landscapes. However, a lot of basic knowledge is still missing. Today superordinate interests are emerging in different sectoral areas (mining of hard stone, renewable energies, transport infrastructure, high-voltage lines, etc.) that require space. If the quality and development goals for the Swiss landscapes are unknown and the subjects of landscape protection are not identified, valuable landscapes will not be protected sufficiently and sites for the use of superordinate interests cannot be selected reasonably.

Specific research topics and knowledge gaps:

Demand

- **Identification of landscape protection sites and landscape development goals:** Define quality and development goals for landscapes in Switzerland and determine where the subjects of landscape protection are located (task of the cantons).

Natural capital

- **Monitoring landscape change:** Building up a monitoring system to observe landscape change.

Land management

- **Landscape-development goals and identification of landscape protection sites:** Define quality and development goals for landscapes in Switzerland and determine where the subjects of landscape protection are located (task of the cantons).
- **Landscape-protection and -development instruments:** Develop instruments for the protection and development of landscapes, e.g. a landscape strategy (some instruments, such as structure plans and a landscape typology, already exist, but are insufficient).
- **Concepts for the protection and development of open spaces and everyday landscapes:** Develop concepts that show how everyday landscapes, open spaces and quiet areas can be protected better and how they can be developed. Make sure that these concepts are integrated into spatial planning.

Documents:

- *Landschaftstypologie Schweiz. Teil 1, Ziele, Methode und Anwendung:* (Bundesamt für Raumentwicklung (ARE); Bundesamt für Umwelt (BAFU) et al., 2011a)
- *Landschaftstypologie Schweiz. Teil 2, Beschreibung der Landschaftstypen:* (Bundesamt für Raumentwicklung (ARE); Bundesamt für Umwelt (BAFU) et al., 2011b)
- *Publications by Silvia Tobias (WSL) on ecosystems in urban areas, e.g. Preserving ecosystem services in urban regions: Challenges for planning and best practice examples from Switzerland:* (Tobias, 2013)
- *Freiraumentwicklung in Agglomerationen:* (Bundesamt für Raumentwicklung (ARE) & Bundesamt für Wohnungswesen (BWO), 2014)

- *Gesundheit fördern, Landschaft gestalten. Gesundheitsressource Landschaft: Wie sich in Gemeinde-, Stadt- und Quartierentwicklungen dieses Potenzial nutzen lässt:* (Stiftung Landschaftsschutz Schweiz & naturaqua PBK, 2015)
- *Press releases of the Swiss Foundation for Landscape Conservation*

Stakeholders:

- NGO, network, national/regional/local authority, workshop participants

CH 2.8: Mountain regions

Relevance of the issue and justification of the need for research:

Switzerland's mountain regions are under pressure from a host of minor changes, which however add up when put together. The question arises whether the quality of the mountain regions (retreat area, identification area, economic zone, social space, natural space, landscape area etc.) can be maintained in the long-term under the prevailing conditions. The recultivation of construction sites in mountain regions for agricultural production purposes has been cited as a challenge. In this field, adequate implementation guidelines are missing.

Specific research topics and knowledge gaps:

Land management

- **Challenges in mountain regions:** Develop integral planning approaches to define and steer the desired aims of development, and to preserve the qualities of the mountain regions. This requires new knowledge in the following fields:
  - Develop approaches to deal with emigration from mountain regions; show how an organised, planned retreat from emigration areas can be implemented and how scrub encroachment (advance of scrubs and trees onto agricultural land) can be countered.
  - Develop strategies to tackle the effects of climate change in mountain regions.
  - Show how tourism which has taken root in mountain regions can be dealt with.
  - Find solutions on how to organise supply and infrastructure in mountain regions.
- **Guidelines for the recultivation of construction sites in mountain regions:** Develop guidelines on how to recultivate construction sites in mountain regions (rules, manuals).

Impacts

- **Challenges in mountain regions:** Develop integral planning approaches to define and steer the desired aims of development, and to preserve the qualities of the mountain regions. This requires new knowledge in the following fields:
  - Develop approaches to deal with emigration from mountain regions; show how an organised, planned retreat from emigration areas can be implemented and how scrub encroachment (advance of scrubs and trees onto agricultural land) can be countered.
  - Develop strategies to tackle the effects of climate change in mountain regions.
  - Show how tourism which has taken root in mountain regions can be dealt with.
  - Find solutions on how to organise supply and infrastructure in mountain regions.

Documents:

- *Existing cantonal guidelines on the recultivation of construction sites in the alps*
- *Boden und Bauen. Stand der Technik und Praktiken:* (Bellini, 2015)

Stakeholders:

- National/regional/local authority, university/research institute, network, workshop participants

CH 2.9: Geological underground sites

Relevance of the issue and justification of the need for research:

Geological underground sites are not used optimally in Switzerland because the country has no underground planning. Currently, the principle "first come, first served" is applied. In Switzerland the geological underground belongs to the landowners down to the depth which they use. As a result, it is increasingly used by private landowners (e.g. by geothermal probes) and there is no room left for superordinate interests. In addition, it has become difficult to mine gravel, sand and other geological raw materials in Switzerland, because the easily accessible deposits are depleted. Overlapping uses such as residential areas, forests or protection areas prevent the further mining of existing deposits.

Specific research topics and knowledge gaps:

Demand

- **Consideration of underground land-use claims:** Develop criteria, tools and instruments to weigh up different underground land-use claims. Revise the legal framework for assessing underground land-use claims so that society can gain the maximum possible benefit from the use of the geological underground.
- **Scarce geological raw materials:** Find new deposits and resolve conflicting uses of the land and the geological underground so that known deposits can be mined.

Land management

- **Consideration of underground land-use claims:** Develop criteria, tools and instruments to weigh up different underground land-use claims. Revise the legal framework for assessing underground land-use claims so that society can gain the maximum possible benefit from the use of the geological underground.
- **Scarce geological raw materials:** Find new deposits and resolve conflicting uses of the land and the geological underground so that known deposits can be mined.

Documents:

- *Rohstoffsicherungskonzept, RoSiK (under progress)*
- *Le régime du sous-sol en droit suisse : planification - exploitation - construction:* (Carrel, 2014)
- *Die Nutzung des geologischen Untergrunds in der Schweiz: Empfehlungen des Schweizer Geologenverbands CHGEOL zur Harmonisierung von Verfügungshoheit, Sachherrschaft und Nutzungsvorschriften: (Schweizer Geologenverband (CHGEOL), 2012)*
- *Poster on the KiesRohstoffStudie Schweiz KiRoSt:* (Netzwerk Mineralische Rohstoffe Schweiz (NEROS), 2014)
- *Evaluation von Potenzialgebieten für Hartsteinbrüche ausserhalb der Landschaften von nationaler Bedeutung (BLN). Schlussbericht:* (Verband Schweizerischer Hartsteinbrüche (VSH); Bundesamt für Landestopografie (swisstopo) et al., 2012)

Stakeholders:

- National/regional/local authority, workshop participants

CH 2.10: Alternative energies

Relevance of the issue and justification of the need for research:

In 2011, Switzerland decided to gradually phase out nuclear energy. As a result, the demand for sites for alternative sources of energy is growing. Decision-making tools to select such sites are needed as well as a "Renewable Energy Sectoral Plan (Sachplan erneuerbare Energien)" which compares the various technologies and takes possible future developments into account.

Specific research topics and knowledge gaps:

Demand

- **Draw up a "Renewable Energy Sectoral Plan":** Develop a "Renewable Energy Sectoral Plan" that conducts a comparative assessment of the various technologies (wind, solar, hydroelectric) and also provides answers to possible future developments.

Land management

- **Decision-making support for alternative energy site selection:** Develop the scientific basis and decision-making tools for selecting sites for solar panels, wind farms and hydroelectric power plants.
- **Acceptance of alternative energies:** Develop approaches to enhancing the acceptance of solar panels, wind turbines and hydroelectric power plants by the population.
- **Draw up a "Renewable Energy Sectoral Plan":** Develop a "Renewable Energy Sectoral Plan" that conducts a comparative assessment of the various technologies (wind, solar, hydroelectric) and also provides answers to possible future developments.

Documents:

- *Lösungsansätze für die Schweiz im Konfliktfeld erneuerbare Energien und Raumnutzung:* (Akademien der Wissenschaften Schweiz, 2012)

Stakeholders:

- Network, SME/consultant, university/research institute, others, workshop participants

CH 2.11: Demographic change and lifestyle

Relevance of the issue and justification of the need for research:

The demographic structure in Switzerland is undergoing changes: the number of older people is increasing, and the population is growing primarily due to migration. This has effects on spatial aspects, like housing and residential district development. Furthermore, social trends and lifestyle have spatial implications.

Specific research topics and knowledge gaps:

Impacts

- **Effect of demography on space:** Gain a better understanding of the effect of demographic change on spatial aspects, like housing and residential district development.
- **Effect of social trends and lifestyle on space:** Analyse the effects of social trends and lifestyle on space, e.g. the demand for larger living space.

Stakeholders:

- Business/industry, SME/consultant, university/research institute, workshop participants

CH 2.12: (Economic) drivers and political and economic interests

Relevance of the issue and justification of the need for research:

Spatial planning in Switzerland does not deal with the impact of the capital markets on the construction and real-estate sector nor with locational policy and tax policy. These aspects nevertheless have an effect on spatial aspects, making it important to gain a better understanding of the connections and interactions between these fields. Furthermore, political and economic interests and interrelationships that lie behind spatial planning and land management decisions are often understood insufficiently. Because land speculation still is a lucrative business, instruments are needed to limit this process.

Specific research topics and knowledge gaps:

Land management

- **Steering measures to limit land speculation:** Develop instruments to limit land speculation.

Impacts

- **Impact of economic drivers on spatial aspects:** Gain a better understanding of the impact of locational policy, site competition and tax policy on spatial development. Gain insights on the impact of capital markets on the construction and real-estate sector and on the investment business.
- **Monitoring the drivers of land consumption and urban sprawl:** Building up a monitoring system to observe the drivers of land consumption and urban sprawl.
- **Political and economic interests:** Understand better the political and economic interests and interrelationships that lie behind spatial planning and land management decisions.

Stakeholders:

- Business/industry, SME/consultant, university/research institute, national/regional/local authority, workshop participants

Research field 3: Soil, sediment and water

CH 3.1: Interaction between soil biology and the soil

Relevance of the issue and justification of the need for research:

Soil organisms play an important role in the soil: They interact with each other and with plants and inanimate components, thereby ensuring the functioning of various different soil processes. The impact of this interaction on soil processes, and therefore also on soil functions, is not yet fully understood. However, such an understanding is vital to make optimal use of the soil. Soil biology is also undergoing major changes as a result of genetically-modified organisms and invasive species. The biodiversity in the soil needs to be registered as soon as possible to grasp it at least in a near-natural state.

Specific research topics and knowledge gaps:

Natural capital

- **Role of biodiversity in the fulfilment of soil functions:** Study the role which biodiversity – in particular small organisms (fungi, bacteria, and archaea) – plays in fulfilling soil functions and maintaining material cycles in the soil.
- **Functioning of food webs:** Understand how food webs function (animal-plant-microorganism networks). Study how the different soil organisms interact with each other and how the interaction with plants and inanimate components of the soil works.
- **Register the spatial and temporal heterogeneity of biodiversity:** Register the spatial and temporal heterogeneity of soil-organism communities.

Documents:

- *Website "Sustainable Use of Soil as a Resource", National Research Programme NRP 68 (running):* e.g. Dr. Monika Maurhofer Bringolf, Healthy soils thanks to soil bacteria; Prof. Marcel Van der Heijden, Restoration of soil functions with the help of arbuscular mycorrhiza (Swiss National Science Foundation (SNSF), 2015a)
- *Bulletins of the working group on soil biology (Arbeitsgruppe Vollzug Bodenbiologie, VBB) of the cantonal soil protection agencies and FOEN*
- *Verordnung über Belastungen des Bodens (VBBo) vom 1. Juli 1998 (Stand am 1. Juni 2012):* (Schweizerischer Bundesrat, 2012)

Stakeholders:

- University/research institute, national/regional/local authority, others, workshop participants

CH 3.2: Material flows in the soil

Relevance of the issue and justification of the need for research:

The bio-geochemical processes in the soil are already known for the most part. More knowledge is needed, however, on which role soil organic matter plays. Unknown is also how the material flows in the soil behave under modified conditions and what impact these conditions have on the quantity of the material flows. In fact, modelling studies are already carried out at present, but they are not precise enough to be used as a basis for policy recommendations. Similarly, there is still too little knowledge of how the bio-geochemical processes in the soil can be influenced.

Specific research topics and knowledge gaps:

Natural capital

- **Role of soil organic matter:** Gain a better understanding of the role soil organic matter plays in the soil and its impacts on the agricultural production.
- **Quantitative change of material flows:** Study how the quantity of material flows changes under modified conditions.
- **Impact on biochemical processes:** Understand how the bio-geochemical processes in the soil can be impacted and controlled.

Land management

- **Impact on bio-geochemical processes:** Understand how the bio-geochemical processes in the soil can be impacted and controlled.

Stakeholders:

- University/research institute, others, workshop participants

CH 3.3: Impact of stress factors on ecosystems

Relevance of the issue and justification of the need for research:

A better understanding of the connections and dynamics between soil, sediment and water is needed to manage ecosystems in a sustainable manner. Further, more biological tests must be developed to measure the impact of contaminants on ecosystems. But not only chemical stress factors are a problem to ecosystems. Also physical factors like the effects of climate change (e.g. temperature, insolation, rainfall rates, sedimentation rates) affect the Soil-Sediment-Water-System.

Specific research topics and knowledge gaps:

Natural capital

- **Dynamics and connections in the Soil-Sediment-Water-System:** Gain a better understanding of the dynamics and connections in the Soil-Sediment-Water-System.
- **Material flow of pesticides and antibiotics:** Gain a better understanding of the material flow of pesticides and antibiotics in ecosystems across all environmental compartments.
- **Methods for measuring contaminants in ecosystems:** Improve and supplement the methods for measuring contaminants in ecosystems through biological indicators (biological tests). Study the effect of pesticide components (e.g. neonicotinoids) on ecosystems.
- **Effect of climate change on the Soil-Sediment-Water-System:** Study the effect of climate change on Swiss agriculture and its impact on the Soil-Sediment-Water-System.

Impacts

- **Material flow of pesticides and antibiotics:** Gain a better understanding of the material flow of pesticides and antibiotics in ecosystems across all environmental compartments.
- **Methods for measuring contaminants in ecosystems:** Improve and supplement the methods for measuring contaminants in ecosystems through biological indicators (biological tests). Study the effect of pesticide components (e.g. neonicotinoids) on ecosystems.
- **Effect of climate change on the Soil-Sediment-Water-System:** Study the effect of climate change on Swiss agriculture and its impact on the Soil-Sediment-Water-System.

Documents:

- *Bedarfsabklärung eines Aktionsplans zur Risikoreduktion und nachhaltigen Anwendung von Pflanzenschutzmitteln. Bericht des Bundesrates in Erfüllung des Postulates Moser vom 16. März 2012 (12.3299):* (Eidgenössisches Departement für Wirtschaft Bildung und Forschung WBF, 2014)

Stakeholders:

- University/research institute, workshop participants

CH 3.4: Agricultural land management

Relevance of the issue and justification of the need for research:

Agricultural land management has a major influence on soil quality. Research is needed on this subject to preserve the quality of agricultural soils in the long term. However, new land management methods only develop their positive effect when they are actually applied. Thus, research on the farmers' acceptance of land management methods is also needed.

Specific research topics and knowledge gaps:

Land management

- **Land management methods to promote soil biodiversity:** Find land management methods that promote soil biodiversity.
- **Biological plant protection:** Find herbal active ingredients that can be used in organic agriculture for plant protection.
- **Bio control methods:** Find bio control methods (living organisms - e.g. bacteria - or combinations of living organisms) for land management, yield increase and plant protection.
- **Acceptance of bio control methods:** Show how bio control methods have to be designed, that farmers actually use them. Show how these methods can be produced and applied cost-efficiently.
- **Land management methods to enhance the soil structure and stability:** Determine land management methods that enhance the stability of the soil, while maintaining productivity and the soil functions with minimal use of chemicals (research on non-tillage farming, fertilisation and application of organic matter). Identify measures that optimally stabilise the soil under specific local conditions.
- **Prevent soil compaction through vehicle selection:** Improve tractor tyres and wheels so that they do not compact the soil. Refine tools such as Terranimo (see documents).
- **Land management methods to ensure protection from the effects of climate change:** Identify and develop land management methods to protect the soils and lakes in Switzerland from the effects of climate change (e.g. increased erosion).
- **Land management methods to counteract climate change by carbon-sequestration:** Identify and develop land management methods that sequestrate carbon into the soil.

Documents:

- *Website "Sustainable Use of Soil as a Resource", National Research Programme NRP 68 (running):* e.g. Prof. Théodor Turlings, Fighting harmful soil organisms with nematodes and soil bacteria (Swiss National Science Foundation (SNSF), 2015a)
- *Website Online-Tool Terranimo:* (Hochschule für Agrar- Forst- und Lebensmittelwissenschaften (HAFL); Forschungsanstalt Agroscope Reckenholz-Tänikon (ART) et al.)
- *IPPC-Reports*

Stakeholders:

- University/research institute, national/regional/local authority, others, workshop participants

Research field 4: Data and harmonisation

CH 4.1: Soil data

Relevance of the issue and justification of the need for research:

There is no nation-wide soil map of Switzerland, although such a map would be an important basis for spatial planning. As conventional soil mapping is very time-consuming and expensive, research on interpolation methods along with the use of drones and satellites for digital soil mapping are needed.

Specific research topics and knowledge gaps:

Natural capital

- **Data acquisition and interpolation methods for soil maps:** Develop new, feasible data acquisition methods using drones and satellites for digital soil mapping. Develop new and improved interpolation and modelling methods to obtain area information from point data. Integrate these new methods into the conventional soil mapping methods.
- **Improve the soil information data base:** Use conventional mapping of new soil points to improve the data density.

Documents:

- *Remote Sensing of Soils:* (Wulf; Mulder et al., 2015)
- *Publications of the SSSS (Swiss Soil Science Society) on traditional soil mapping (see website):* (Soil Science Society of Switzerland (SSSS), 2014)
- *Publications of Andreas Papritz, ETH Zürich on modelling of soil data, e.g. Estimating soil organic carbon stocks of Swiss forest soils by robust external-drift kriging:* (Nussbaum; Papritz et al., 2014)

Stakeholders:

- National/regional/local authority, network, SME/consultant, university/research institute, others, workshop participants

CH 4.2: Ecosystem data

Relevance of the issue and justification of the need for research:

Some of the statistical data on the state of ecosystems in Switzerland are out of date (because of rapid degradation) or are simply unavailable. Such data is urgently needed to be able to manage ecosystems in a sustainable way. Furthermore a monitoring system to observe the flows of pesticides and antibiotics through all compartments of the ecosystem is urgently needed.

Specific research topics and knowledge gaps:

Impacts

- **Data on the quality of ecosystems:** Assess how the quality of ecosystems has changed over time in Switzerland. Assess the pollution of ecosystems by contaminants. Identify the contaminants and the pollution hotspots.
- **Data on the movement of erosion material:** Assess the movement of washed-away soil and the accumulation sites.
- **Monitoring pesticides and antibiotics:** Develop a monitoring system to monitor pesticide and antibiotic flows through all compartments of the ecosystem.

Stakeholders:

- University/research institute, workshop participants

CH 4.3: Sediment data

Relevance of the issue and justification of the need for research:

The Swiss Soil Monitoring Network (Nationale Bodenbeobachtung, NABO) is a system that allows Switzerland to monitor the soil quality across the country. With the National Groundwater Monitoring (Nationale Grundwasserbeobachtung, NAQUA) Switzerland observes the groundwater resources. However, the sediment quality is not monitored.

Specific research topics and knowledge gaps:

Natural capital

- **Monitoring sediment quality:** Develop a monitoring system to monitor the sediment quality in Switzerland.

Stakeholders:

- University/research institute, workshop participants

CH 4.4: Harmonisation

Relevance of the issue and justification of the need for research:

Understanding how ecosystems function requires close cooperation between researchers from different disciplines. However, there is currently a lack of basis documents that make the connection between soil, sediment and water. As well missing in the field of ecosystems are uniform data acquisition and sampling methods, binding standards for biological tests and a standardised terminology. In the field of soils, better links between existing soil data records as well as uniform soil description standards would improve the information base a lot. NABODAT is a soil information system with the aim to link the already existing soil data in Switzerland.

Specific research topics and knowledge gaps:

Natural capital

- **Missing basis documents on the Soil-Sediment-Water-System:** There is a lack of basis documents interlinking soil, sediment and water.
- **Missing harmonisation in the field of ecosystems:** Standardise the vocabulary used by different scientific disciplines and also by the administrative authorities. Standardise the sampling methods between cantons and between states for collecting ecosystem data. Standardise the methods for assessing and analysing ecosystem data. Develop binding standards for biological tests to identify stress factors in ecosystems.
- **Missing harmonisation in the field of soils:** Develop binding soil description standards. Bring existing soil data records together. Coordinate the soil strategies between different states.

Land management

- **Missing harmonisation in the field of soils:** Develop binding soil description standards. Bring existing soil data records together. Coordinate the soil strategies between different states.

Stakeholders:

- University/research institute, workshop participants

Research field 5: Implementation and awareness-raising activities

CH 5.1: Conflicts and dialogue regarding land and soil use

Relevance of the issue and justification of the need for research:

There are no adequate instruments in place for resolving conflicts regarding land and soil use. Furthermore, in practice, there is often a lack of concrete knowledge on how to weigh up interests against each other and on how to hold stakeholder dialogues. As the land and soil in Switzerland are under a lot of pressure, support is needed in this field.

Specific research topics and knowledge gaps:

Land management

- **Methods for weighing up interests:** Show how interests can be weighed up in practice. Show how an effective stakeholder dialogue is conducted.
- **Approaches to resolving conflicts regarding land and soil use:** Find approaches to resolving conflicts that involve the stakeholders concerned. Create conflict-resolution 'laboratories' in which general conditions and goals are defined and potential solutions are worked out.

Documents:

- *Testplanung – Methode mit Zukunft: Grundzüge und Hinweise zur praktischen Umsetzung am Beispiel der Testplanung Riedholz/Luterbach:* (Scholl; Vinzens et al., 2013) (the mentioned „laboratories“ could be built up analogically)

Stakeholders:

- National/regional/local authority, SME/consultant, workshop participants

CH 5.2: Concrete implementation and project management

Relevance of the issue and justification of the need for research:

For several spatial planning issues in Switzerland, visions and targets have been formulated that point to the direction future development should take. However, these visions and targets are partly not applied, because it is not clear how to implement them in practice. It is crucial to develop support measures and guidelines that serve this purpose. Furthermore, major spatial planning projects represent a challenge because they cover periods of up to 50 years. Therefore, project planning must allow some scope for uncertainties, to be able to respond to new developments also after the start of the project.

Specific research topics and knowledge gaps:

Land management

- **Concrete implementation of visions and targets:** Show how visions and targets can be brought down to a feasible level and integrated in the planning process. Develop appropriate implementation instruments.
- **Project management of long-term projects:** Indicate how long-term spatial planning should be refined so as to be able to react to new developments after the start of the project. Improve the process design for long-term projects. Document examples of best practice in interdisciplinary long-term projects.

Stakeholders:

- National/regional/local authority, SME/consultant, network, others, workshop participants

CH 5.3: Cooperation and knowledge transfer

Relevance of the issue and justification of the need for research:

A lot of existing knowledge is never applied in practice due to insufficient cooperation and exchange. In addition, there is a flood of information today which makes it difficult to find relevant knowledge from other disciplines. Searches by keywords are insufficient because different disciplines use different terminology.

Specific research topics and knowledge gaps:

Impossible to assign to the overarching themes

- **Organise interdisciplinary cooperation:** Document examples of how smooth interdisciplinary cooperation can be organised between practitioners, between researchers as well as between practitioners and researchers.
- **Organise and explore transdisciplinary processes:** Show how exchange can be enhanced by transdisciplinary processes. Explore the concrete implementation and the effects of transdisciplinary processes further.
- **Transfer of knowledge:** Identify how knowledge transfer works. Show how knowledge transfer has to be designed, so that knowledge actually is going to be implemented.
- **Interlink knowledge:** Develop data mining tools to establish interrelations between knowledge from different disciplines and to make it available efficiently.

Stakeholders:

- National/regional/local authority, university/research institute, workshop participants

CH 5.4: Awareness-raising

Relevance of the issue and justification of the need for research:

Soil protection, protection of cultivated land, sustainable production and consumption are issues that do not rate high on the radar of the population at large. Little notice is taken of the work that farmers do for the general public. This means that there is a need to establish knowledge, on how to raise public awareness of these issues. Moreover, many farmers fear that ecological management means production losses. Strategies must therefore be developed to show how farmers could get convinced to strive for a more sustainable production. In the past, the OLMA and BEA agricultural trade fairs were events where genuine exchanges between farmers and non-farmers took place. Today, these agricultural trade fairs are more dedicated to entertainment. Such real interaction between farmers and non-farmers should be restored so that the two sides have the chance to understand each other better.

Specific research topics and knowledge gaps:

Impossible to assign to the overarching themes

- **Awareness-raising initiatives on sustainability issues among the general public:** Develop approaches which show how to raise awareness about soil protection, protection of cultivated land, sustainable production and consumption within the general public.
- **Awareness-raising initiatives on sustainability issues among farmers:** Develop strategies on how to convince farmers to produce more ecologically sound and cause less damage to the soil (e.g. smaller tractors). Develop approaches that motivate farmers to apply and implement new knowledge.
- **Strategies to bring farmers and non-farmers closer together:** Develop strategies on how farmers and non-farmers could be brought closer together and therefore get a better understanding of one another's view.

Documents:

- *Soil biodiversity and bioindication: From complex thinking to simple acting:* (Havlicek, 2012)
- *Motivations for implementation of ecological compensation areas on Swiss lowland farms*: (Home; Balmer et al., 2014)

Stakeholders:

- University/research institute, national/regional/local authority, workshop participants

16.4 Experiences regarding connecting science to policy/practice

16.4.1 Use of knowledge

Sources of knowledge

As shown in the table below, for most of the interviewed stakeholders, the personal network is very important to gain new knowledge for doing their job. Scientific papers and other publications are also important sources of knowledge. Besides, many stakeholders inform themselves at conferences, congresses and workshops.

Sources of knowledge	Number of mentions
Colleagues, personal network	16
Scientific publications	15
Conferences, congresses, workshops	11
Other publications and reports	10
Internet	8
Professional associations, networks, platforms, advisory groups	5
Databases and basic information of the administration	5
Experiences and Examples from Switzerland	3
Experiences and Examples from abroad	3
Research- or consultant projects ordered by your institution	3
Media (print, radio, TV…)	1
Twitter, Facebook	1
Library, archive	1
Interviews	1
Public-private-partnerships	1

n=19

Use of scientific knowledge by persons from the non-science sector

All stakeholders from the non-science sector use scientific knowledge at work. This may be through scientific papers, other scientific publications or through conferences and congresses they attend to. Some use scientific knowledge every day; others use it particularly when they start a new project to get new input and to know the state-of-the-art.

Knowledge transfer from science to policy and practice

Because it is difficult to measure how much state-of-the-art scientific knowledge has been used for the formulation of existing policies in Switzerland, we asked our stakeholders, which institutions in Switzerland help integrating scientific knowledge into policy and practice, and how this transfer could be improved. In the following table we give an overview on the institutions in Switzerland, where knowledge flows from the science to the non-science sector or the opposite direction. The table has been complemented at the Swiss NKS-workshop; it is not conclusive, however. After that, we show in which fields knowledge transfer is insufficient today. How knowledge transfer could be improved, we discuss in section *16.4.3 Science- policy- practice: Experiences in doing research and synthesizing of scientific knowledge by stakeholders from the non-science sector.* Many of the stakeholders' experiences in doing research or synthesizing scientific knowledge, referred to knowledge transfer and its improvement. To prevent repetitions, we decided to discuss this topic only in section 16.4.3.

Knowledge transfer science <–> policy, practice

Research:

- SNF, Swiss National Science Foundation (e.g. knowledge transfer in National Research Programmes, NRPs)
- Universities of applied sciences (e.g. training days, master thesis in collaboration with private enterprises)
- Universities (e.g. master thesis in collaboration with private enterprises)
- Agroscope, Swiss centre of excellence for agricultural research (e.g. Exchange with Federal Office for Agriculture FOAG, exchange with farmers)
- ETH, EPFL, Swiss Federal Institute of Technology (e.g. NSL - Network City and Landscape, conferences)
- WSL, Swiss Federal Institute for Forest, Snow and Landscape Research (e.g. Forum for knowledge, courses for forestry offices, contact with soil protection agencies)
- EAWAG, Swiss Federal Institute of Aquatic Science and Technology
- FiBL, Research Institute of Organic Agriculture

Administration:

- Working groups within and between Federal Offices with people from science, policy and practice (e.g. Federal Office for the Environment FOEN: VBB, Arbeitsgruppe Vollzug Bodenbiologie [working group on soil biology])
- Working groups within and between cantons, meetings of cantonal agencies (e.g. annual meeting of the cantonal soil protection agencies)
- Knowledge transfer within research studies, ordered by the administration

Networks, associations, platforms:

- SSSS, Swiss Soil Science Society (e.g. working groups, conferences, excursions, training days, education for pedological site agents)
- ROSOL, Commission romande pour la protection des sols
- Agridea (e.g. conferences, consulting, training days for farmers)
- Landwirtschaftliche Schulen, Gartenbauschulen
- SUAN, Swiss Urban Agriculture Network
- Forum Landschaft [Forum Landscape] (e.g. conferences, workshops, newsletter)
- Sanu [Trainings and education in the environmental field]
- GWG, Gebirgswaldpflegegruppe [Mountain Forest Cultivation Group]
- NEROS, Netzwerk Mineralische Rohstoffe Schweiz [Network Mineral Raw Materials Switzerland]
- Swiss Academies of Arts and Sciences (e.g. td-net, Network for Transdisciplinary Research): SCNAT, Swiss Academy of Sciences (e.g. SWIFCOB, Swiss Forum on Conservation Biology); SAHS, Swiss Academy of Humanities and Social Sciences; SATW, Swiss Academy of Engineering Sciences
- Regiosuisse, network unit for regional development
- SIA, Swiss Society of Engineers and Architects (e.g. conferences, publications)
- VSS, Schweizerischer Verband der Strassen- und Verkehrsfachleute [Swiss Society of highway and transport experts]
- Netzwerk Raumplanung [Network Spatial Planning]
- VLP-ASPAN, Schweizerische Vereinigung für Landesplanung [Swiss association for spatial planning] (e.g. knowledge transfer and integration, conferences, courses, publications)
- FSU, Fachverband Schweizer Raumplaner [association of Swiss Spatial Planners] (e.g. conferences)
- Modellvorhaben nachhaltige Raumentwicklung [Pilote programme sustainable spatial development]
- Network for Transdisciplinary Research (td-net)
- Internet-Tools (e.g. Terranimo, erosion risk maps)
- Social networks: Groups on spatial planning (e.g. on Xing, Linkedin, Twitter, Facebook)

Journals:

- Forum Raumentwicklung [Journal of the Federal Office for Spatial Development, ARE]
- disP - The Planning Review [Journal of the ETH Zurich]
- Hotspot [Journal of the Swiss Biodiversity Forum]
- N + L inside [Journal of KBNL and the Federal Office for the Environment FOEN]
- Hochparterre [News in architecture, planning and design]
- Tec21 [Journal of the SIA]
- Inforaum [Journal of VLP-ASPAN]
- Raum & Umwelt [Journal of VLP-ASPAN]
- Swiss Bulletin for Applied Geology
- Wald und Holz [Journal of forestry and timber industry]
- Die Grüne [Magazine on Swiss agriculture]
- Agrarforschung Schweiz [Journal of Agroscope]

The interviewees and also the workshop participants stressed, that knowledge not only flows between science and policy/practice, but also within policy/practice. In many of the institutions mentioned in the table above, such knowledge transfer also takes place. However, some additional institutions have been mentioned where knowledge mainly is transferred within policy and practice, such as the KPK, Kantonsplaner Konferenz [Conference of cantonal planners], the Kantonsgeologen Konferenz [Conference of cantonal geologists], the KBNL, Konferenz der Beauftragten für Natur- und Landschaftsschutz [Conference of conservation and landscape protection agents], Swissmelio, Schweizerische Vereinigung für ländliche Entwicklung [Swiss association for rural development], the Gemeindeverband [association of the municipalities] and Städteverband [association of the cities] and agricultural fairs, such as BEA or OLMA.

Missing knowledge transfer

In several sectors, knowledge transfer between science and policy/practice is viewed as insufficient in Switzerland. In the field of **surface water**, journals are missing that process scientific knowledge for non-scientists. Furthermore, a nationwide network that comprises surface water experts from the science and the non-science sector would be needed to enhance knowledge exchange. In the field of **geological underground** the exchange between scientists and the industry is insufficient – however, more public-private-partnerships would improve this situation. Moreover, professionals from the industry would need continuing high-quality educational trainings to keep themselves up to date. In the field of **spatial planning**, more direct contact between scientists and policymakers is to be established. Finally, a sound education on urban planning is missing in Switzerland.

16.4.2 Possibilities to set the agenda

The interviewed stakeholders have different methods and opportunities to influence research agendas in Switzerland.

Stakeholders from **networks and NGOs** try to influence the setting of research topics by inputs in conferences and workshops and by expert opinions they give. Besides, some of them are part of an advisory group within the Swiss administration and bring in important input on knowledge gaps this way.

Stakeholders from **Federal Offices** give thematic inputs for new National Research Programmes (NRPs) of the Swiss National Science Foundation. They also may influence the research concepts of their own office (*see chapter 16.3.2 Topics / research agendas to include in the SRA: Research agendas by Federal Offices and other Swiss institutions related to the scope of INSPIRATION*). This so called “departmental research” (Ressortforschung) comprises research within the Federal Offices, but also research they fund externally (Bundesamt für Raumentwicklung (ARE), 2012). By funding research, Federal Offices influence, which research topics are actually getting explored.

Stakeholders from **research institutions** influence the setting of research topics through their own work and interests. Besides, researchers give inputs for new NRPs and are asked for expert opinions during the planning phase of NRPs.

16.4.3 Science – policy – practice

Experiences in doing research and synthesizing of scientific knowledge by stakeholders from the non-science sector

Most of the stakeholders from the non-science sector were already involved in research projects and/ or have synthesized scientific knowledge for policy and practice. In the following we give an overview on the experiences the interviewed stakeholders thereby made and on their suggestions for improvement.

Some stakeholders regard knowledge transfer in Switzerland as sufficient and well established. More stakeholders however, consider the **transfer of knowledge from science to policy and practice** as a crucial point which needs improvement. From their point of view, more emphasis should be laid on this aspect:

- **Processing and disseminating results:** Results of a research project cannot just be transferred to policy and practice. They have to be processed, valuated and brought down to an applicable level. Very helpful for people from policy and practice are good examples – they are much easier to understand and adopt. Also helpful are "guidelines for successful implementation" with tips and support material for practitioners. One stakeholder suggests sending new results directly to policy makers. Other stakeholders believe it to be more efficient to let communication specialists doing this job – such as institutions that process scientific knowledge for policy and practice professionally and make it available on a platform. Networks with members from science, policy and practice are viewed also as very valuable to disseminate knowledge. Yet another approach could be the use of new media to reach particular target groups.
- **Use of language:** Special attention has to be turned to the language of texts addressing people from the non-science sector. Such texts have to be easy to understand and not in academic but in a more journalistic language.
- **Responsibilities for communication:** In every research project one person should be responsible for the communication between science and the non-science sector. From the beginning of a project, this person is to be in close contact with policy, practice and the scientists, to ensure that the research project also addresses the important questions of the non-science sector. The job of this person would also be to ensure that the scientists produce results on an applicable level.
- **Cooperation of science and policy/practice:** To enhance knowledge transfer, the interviewed stakeholders suggest fostering public-private-partnerships, promoting transdisciplinary projects and taking up the problems of practitioners and policy makers to a greater extent.
- **Political interests as an obstacle to knowledge transfer:** Some stakeholders view political interests as an obstacle to knowledge transfer. They experience that scientific results sometimes are being ignored, because they do not correspond with the policy makers' political beliefs. In other cases policy makers may exploit scientific knowledge for their own purposes.

Transdisciplinary and interdisciplinary research are other topics that have been mentioned by several stakeholders:

- **Transdisciplinarity as a misapprehended concept:** In the interviews it has been criticised that transdisciplinarity is a term that often is misapprehended. A project, where scientists have some contact with persons from the non-science sector is not yet a transdisciplinary project. For transdisciplinarity real involvement from the very beginning of the project until the end is mandatory. However, correctly applied, the method is considered as an option that facilitates the adoption and use of knowledge by persons from policy and practice.
- **Good examples of transdisciplinary processes and institutions:** The National Research Programme “NRP 61, Sustainable Water Management" and the National Centre of Competence in Research “NCCR North-South” have been mentioned as good examples of transdisciplinary research. Moreover, in Switzerland the Swiss Academies of Arts and Science, which is an association of the four scientific academies in Switzerland, operate a Network for Transdisciplinary Research (td-net). The aim of td-net is to promote learning processes between inter- and transdisciplinary scientists and to foster inter- and transdisciplinary processes by providing expertise, methods and tools (Swiss Academies of Arts and Sciences, 2014; Swiss Academies of Arts and Sciences, 2015). At the ETH Zurich, the Department of Environmental Systems Science (USYS) runs the Transdisciplinarity Lab (TdLab) which trains students, coordinates and conducts transdisciplinary research and supports transdisciplinary processes (ETH Zurich, 2016). The TdLab has been mentioned in the interviews as a good example for an institution fostering transdisciplinarity.
- **Interdisciplinary research and implementation:** Interdisciplinary research and implementation are viewed as important. Particularly in projects within the federal or cantonal administration, joint approaches should be found.

Assessment of the impact of scientific research

According to the interviewees, the societal, political or economic impact of scientific research in the fields of spatial planning, land use and soil management is not assessed in Switzerland – with two exceptions. Firstly, Agroscope, Swiss centre of excellence for agricultural research, performs an annual efficacy assessment (Wirksamkeitsabschätzung). The indicators for efficacy are the research results that are actually integrated in Swiss legislation. The efficacy assessment is an internal document. Secondly, the effectiveness of National Research Programmes (NRPs) is getting evaluated from time to time. In the evaluation from 2007, the implementation and the use of research results from NRPs is assessed among other parameters (Staatssekretariat für Bildung und Forschung (SBF), 2007).

Science-policy-interface documents

In the following, documents are listed that discuss the science-policy-interface.

Research agendas from the Swiss Federal Offices, discussing the science-policy-interface:

- *Forschungskonzept Land- und Ernährungswirtschaft 2013-2016:* (Bundesamt für Landwirtschaft (BLW), 2012) Research agenda on agriculture and nutrition economy of the Federal Office for Agriculture (FOAG)
- *Forschungskonzept Nachhaltige Raumentwicklung und Mobilität 2013-2016:* (Bundesamt für Raumentwicklung (ARE), 2012) Research agenda on sustainable spatial development and mobility of the Federal Office for Spatial Development (ARE)
- *Forschungskonzept Nachhaltiger Verkehr 2013-2016:* (Bundesamt für Strasse (ASTRA) & Bundesamt für Verkehr (BAV), 2012) Research agenda on sustainable transport of the Federal Office of Transport (FOT)
- *Forschungskonzept Umwelt für die Jahre 2013-2016. Schwerpunkte, Forschungsbereiche und prioritäre Forschungsthemen:* (Miranda; Jacquat et al., 2012) Master plan on environmental research of the Federal Office for the Environment FOEN

Further science-policy-interface documents:

- *Identifying urban transformation dynamics: Functional use of scenario techniques to integrate knowledge from science and practice*: (von Wirth; Wissen Hayek et al., 2014)
- *Soil biodiversity and bioindication: From complex thinking to simple acting:* (Havlicek, 2012)
- *Engagement at the Science–Policy Interface:* (Hering; Dzombak et al., 2014)
- *How to Manage Knowledge Sharing: Experiences from Research Practice:* (Fry; Zingerli et al., 2011)
- *Mit Wissenschaft die Politik erreichen:* (Akademien der Wissenschaften Schweiz, 2015) Swiss Academies Report on the science-policy interface

16.5 National and transnational funding schemes

16.5.1 Funding schemes and possibilities for research funding

Public and private funding schemes

In the following table, we provide an overview on public and private funding schemes on regional, national, European and international/transnational level that were mentioned during the interviews or the workshop. After that, some of the funding schemes are explained in a more detailed way. As the INPIRATION-Project is interested on experiences how to best set up funding options so that societal demands are getting fulfilled and new knowledge is taken up, we would especially like to point to the National Research Programmes by the Swiss National Science Foundation which are also discussed in the following.

R&I funding options collated for country:	Switzerland			
	Name*	**Research and Innovation funder****	**What and/or whom do they fund?*****	**More info********
Regional				
Foundations				
1	Hamasil Foundation	Hamasil Foundation	Inter alia, support of research projects on sustainability and ecology (active in the region of Zurich)	http://www.hamasil.ch
Cantonal Administrations				
2	Cantonal support of research projects	Cantons	Cantons sometimes support research projects they are interested in	
National				
Foundations				
1	Sophie und Karl Binding Foundation	Sophie und Karl Binding Foundation	Inter alia, support of concrete projects and applied research projects in Switzerland to protect and enhance the quality of the landscape and to prevent urban sprawl.	http://www.binding-stiftung.ch
2	Ernst Göhner Foundation	Ernst Göhner Foundation	Inter alia, support of research projects in all disciplines at Swiss universities (no basic and no commercial research). However, they do not accept applications from medical, natural and technical science because in these fields, they define the topics they fund with the research institutions directly.	http://www.ernst-goehner-stiftung.ch
3	Gebert Rüf Foundation	Gebert Rüf Foundation	Support of innovative projects and young academics at Swiss universities. Funding of applied research with the aim to produce something totally new and to foster knowledge transfer.	http://www.grstiftung.ch/en.html
4	Maria und Heinrich Th. Uster-Foundation	Maria und Heinrich Th. Uster-Foundation	Inter alia, funding of research and implementation of technologies to enhance life quality in settlement areas such as energy efficiency, fresh air supply and noise prevention. Funding of projects that promote an economical use of the soil (implementation not research).	http://www.usterstiftung.ch/index.php
5	Mava-Foundation	Mava-Foundation	Support of projects that aim at conserving biodiversity and ecosystem functions, fostering sustainable management and the use of natural resources and promoting a strong and effective conservation community. The foundation funds projects in the Mediterranean, Costal West Africa, the Alpine Arc and all of Switzerland.	http://en.mava-foundation.org/

6	Foundation for the Third Millennium	Foundation for the Third Millennium	Support of projects that foster sustainability. The Foundation favors projects from Switzerland and the surrounding counries and does not support projects that are solely research.	http://www.stiftung-drittes-millennium.com/en/stiftung/stiftungszweck.html
7	Foundation Mercator Schweiz	Foundation Mercator Schweiz	Inter alia, support of research and implementation projects in the fields of environmental responsibility, sufficiency, and ecological agriculture. Promotion of inter- and transdisciplinary approaches and knowledge transfer. The project partner generally has to be located in Switzerland.	http://www.stiftung-mercator.ch/
Networks, Societies, NGOs				
8	Research of the SIA, Swiss Society of Engineers and Architects	SIA, Swiss Society of Engineers and Architects	Funding of research projects they perceive as important knowledge gaps.	http://www.sia.ch/en/the-sia/the-sia/
9	Research of the VSS, Schweizerischer Verband der Strassen- und Verkehrsfachleute [Swiss Society of highway and transport experts]	VSS, Schweizerischer Verband der Strassen- und Verkehrsfachleute (the financial resources stem from the Swiss petroleum tax)	Funding of application-oriented research projects in the fields of highways and transport.	http://www.vss.ch/
10	Financial contribution to research projects by Bio Suisse	Bio Suisse	Sometimes supports research projects linked to biological agriculture	http://www.bio-suisse.ch/en/home.php
11	Financial contribution to research projects by NGO's, e.g. Pro Natura	NGO's, e.g. Pro Natura	Sometimes support research projects linked to their field of activity	http://www.pronatura.ch/aktuell
Commercial Companies				
12	Financial contribution to research projects by commercial companies, e.g. Migros, Coop, Pensimo	Commercial Companies, e.g. Migros, Coop, Pensimo	Sometimes support research projects linked to their field of activity	
Swiss National Science Foundation				
13	Project Funding	SNF Swiss National Science Foundation	Funding opportunity, open to experienced scientists of all disciplines working in Switzerland	http://www.snf.ch/en/funding/projects/Pages/default.aspx
14	Career Funding	SNF Swiss National Science Foundation	Funding of fellowships, respectively wages for researchers and sometimes additionally funding to realise the project	http://www.snf.ch/en/funding/careers/Pages/default.aspx
15	NRP, National Research Programmes	SNF Swiss National Science Foundation	Funding of research projects that approach todays' key challenges in Switzerland. The topics for new NRPs are selected by the Swiss Federal Council.	http://www.snf.ch/en/funding/programmes/national-research-programmes-nrp/Pages/default.aspx http://www.snf.ch/SiteCollectionDocuments/nrp_brochure_e.pdf
16	Sinergia	SNF Swiss National Science Foundation	Funding of inter-, multi- and unidisciplinary research projects where 3-4 research groups collaborate. One research group may be from abroad, if there is no equivalent group in Switzerland.	http://www.snf.ch/en/funding/programmes/sinergia/Pages/default.aspx
17	NCCR, National Centres of Competence in Research	SNF Swiss National Science Foundation	Funding of research projects on topics of strategic importance for Swiss science, economy and society.	http://www.snf.ch/en/funding/programmes/national-centres-of-competence-in-research-nccr/Pages/default.aspx http://www.snf.ch/SiteCollectionDocuments/nccr_brochure_e.pdf#search=nccr%20brochure
Federal Offices and Commissions				
18	COST-Actions funded by the SERI, State Secretariat for Education, Research and Innovation	SERI, State Secretariat for Education, Research and Innovation	Support of research projects related to COST-Actions	http://www.sbfi.admin.ch/themen/01370/02396/02404/02405/index.html?lang=en
19	CTI Projects	CTI, Commission for Technology and Innovation	Support of applied research projects with high innovation potential, built up in close collaboration between scientists and commercial companies. The costs of the research are shared between the company and the CTI.	https://www.kti.admin.ch/kti/en/home/wen-wir-foerdern/forschende.html
20	Modellvorhaben des Bundes [Pilot Programme Sustainable Spatial Development]	Modellvorhaben des Bundes [Pilot Programme Sustainable Spatial Development]	Support of innovative projects in Swiss sustainable spatial planning.	http://www.are.admin.ch/themen/raumplanung/modellvorhaben/index.html?lang=de
21	ARE, Federal Office for Spatial Development	ARE, Federal Office for Spatial Development	Internal research, cooperations with other institutions and contract research in the field of spatial development.	http://www.are.admin.ch/dokumentation/publikationen/00014/00501/index.html?lang=en

22	Research of FEDRO, Federal Roads Office and FOT, Federal Office of Transport	FEDRO, Federal Roads Office; FOT, Federal Office of Transport	Internal research, cooperations with other institutions and contract research in the fields of transport and roads.	http://www.astra.admin.ch/dienstleistungen/04844/04853/04864/?lang=de
23	Research of FOEN, Federal Office for the Environment (e.g. Forest and timber research fund of FOEN, Umwelttechnologieförderung of FOEN [environmental technology aid])	FOEN, Federal Office for the Environment	Internal research, cooperations with other institutions, contract research in the field of environment.	http://www.bafu.admin.ch/publikationen/publikation/01650/index.html?lang=de http://www.bafu.admin.ch/wald/01234/01238/index.html?lang=de, http://www.bafu.admin.ch/innovation/06629/06633/index.html?lang=de
24	Research of FOPH, Federal Office of Public Health	FOPH, Federal Office of Public Health	Internal research, cooperations with other institutions and contract research in the field of public health.	http://www.bag.admin.ch/themen/gesundheitspolitik/00388/00390/01221/
25	Research of SFOE, Swiss Federal Office of Energy	SFOE, Swiss Federal Office of Energy	Internal research, cooperations with other institutions and contract research in the field of energy.	http://www.ressortforschung.admin.ch/html/dokumentation/Forschungskonzepte_13-16/Forschungskonzept_Nachhaltige_Raumentwicklung-und_Mobilitaet_2013-16_d.pdf
26	Research of FOAG, Federal Office for Agriculture	FOAG, Federal Office for Agriculture	Internal research, cooperations with other institutions and contract research in the field of agriculture.	http://www.blw.admin.ch/themen/00008/
27	Research of Swisstopo, Federal Office of Topography	Swisstopo, Federal Office of Topography	Internal research, cooperations with other institutions and contract research in the field of geo-information and geological underground.	http://www.swisstopo.admin.ch/internet/swisstopo/en/home.html
European				
European Commission				
1	Interreg: Alpine Space-Programme	European Regional Development Fund (ERDF)	European transnational cooperation programme for the alpine region. Finding answers to alpine issues.	http://www.alpine-space.eu/
2	Horizon 2020	European Commission and private investments	EU Research and Innovation programme	https://ec.europa.eu/programmes/horizon2020/
3	JPI Joint Programming Initiatives, e.g. FACCE-JPI (Joint Programming Initiative on Agriculture, Food Security and Climate Change)	The members of each Joint Programming Initiative contribute to it financially.	Pooling of national research activities by common funding.	http://ec.europa.eu/research/era/joint-programming_en.html http://www.faccejpi.com/
International/ Transnational				
Commercial Companies				
1	Financial contribution to research projects by commercial companies, e.g. IBM, Michelin, Syngenta	Commercial Companies, e.g. IBM, Michelin, Syngenta	Sometimes support research projects linked to their field of activity	
NGO's, Agencies				
2	Financial contribution to research projects by NGO's, e.g. WWF	NGO's, e.g. WWF	Sometimes support research projects linked to their field of activity	
3	IEA (International Energy Agency) Technology Collaboration Programmes (formerly: Implementing Agreements)	Technology Collaboration Programmes are funded by their participants.	Funding of projects on energy technology research, development and deployment.	http://www.iea.org/tcp

The Swiss National Science Foundation (SNSF)

The Swiss National Science Foundation is a private foundation, which operates on behalf of the Swiss Government. It is the major funding institution for scientific research in Switzerland and funds research in all academic disciplines. The SNSF has different funding instruments at hand*: "Project funding is aimed at experienced researchers working in Switzerland who wish to obtain funding for a project of their own. The research topic can be chosen freely"* (Swiss National Science Foundation (SNSF), 2015d). However, the salary has to be covered by the scientist's research institution. Within the career funding schemes the researcher's person stands in the centre. Scientists apply for a fellowship, respectively salary and sometimes additionally for funding to realise their project. With the programme funding schemes, 12 funding instruments are available where the conceptual/organisational framework or the topic already is given. One type of these programmes are the National Research Programmes (NRPs) that address today's key challenges in Switzerland. Every

two to three years the Swiss Federal Council chooses two to four topics for new NRPs, covering pressing societal, political and economic issues. NRPs give a platform to researchers, policymakers and practitioners to exchange their views and opinions and bring them together. The idea of this exchange is to ensure that knowledge is generated that really helps solving the addressed problem and to facilitate knowledge transfer. Another funding programme is Sinergia which focus on inter-, multi- and unidisciplinary projects where three to four different research groups collaborate. In Sinergia projects, one research group may be from abroad if there is no equivalent group in Switzerland. National Centres of Competence in Research (NCCRs) are a programme to fund long-term high-quality research projects in fields of strategic importance for Swiss science, business and society. It promotes partnerships between science and non-science institutions and aims at enhancing knowledge transfer. Apart from these funding programmes, the SNSF also funds scientific infrastructure and other initiatives to enhance knowledge transfer (Swiss National Science Foundation (SNSF), 2011; Swiss National Science Foundation (SNSF), 2014; Swiss National Science Foundation (SNSF), 2015c).

COST-Actions funded by the State Secretariat for Education Research and Innovation (SERI)

In Switzerland the SERI is responsible for the management of COST-Actions. It decides in which COST-Actions Switzerland takes part in and has a budget to fund certain parts of research projects linked to COST-Actions (State Secretariat for Education Research and Innovation (SERI), 2015).

Modellvorhaben nachhaltige Raumentwicklung [Pilot Programme Sustainable Spatial Development]

The Pilot Programmes Sustainable Spatial Development are an initiative of the Federal Government to promote new approaches and methods in sustainable spatial planning. Local, regional and cantonal actors may propose innovative projects which get financial support if selected. The Pilot Programmes are getting documented and shall serve as a model and example for further projects (Bundesamt für Raumentwicklung (ARE), 2015).

CTI Projects

CTI Projects are research projects of applied science with a high innovation potential, which are built up in close collaboration between scientists and commercial companies. The Commission for Technology and Innovation (CTI) funds 50% of the research costs while the business partner pays the other half. In this way transfer of knowledge and technology shall be enhanced (Commission for Technology and Innovation (CTI), 2015).

16.5.2 Gaps in financial resources for research

Missing funding mechanisms

In this section we present the results from the interviews and the workshop on funding schemes that today are missing and topics which lack of funding opportunities.

- **New financial sources for the generation of soil data:** The generation of soil data in Switzerland is a task of the cantons. However, at the moment most of the cantons are reducing their expenses. Therefore cantonal soil inventories are often not further extended. As soil data is very important for management and planning issues, new financial sources have to be found. One way to find money for this could be a property appreciation tax (a tax on the increased value of a piece of land, when it is rezoned from agricultural zone to building zone).
- **Commonly funded bottom-up research:** Another interesting funding option for research projects dealing with soil and land issues could be bottom-up induced research. The Federation and the cantons could set up a funding scheme, where local actors could bring in research questions which are important for them to be answered. In addition to the financial contribution by the public authorities, also the local actors would have to invest into the research project.
- **Funding of half-applied research:** Funding mechanisms are missing for projects that are not anymore basic, but not yet applied science. One interviewee indicated that within the NRPs, the Swiss National Science Foundation funds such half-applied research. However, it is one of the few institutions that does so in Switzerland. Besides, the interviewee points out that NRPs are always limited to a certain topic and to a fixed duration. Thus, setting-up constant funding mechanisms for half-applied research projects would be important. Another stakeholder specifies, that funding especially is needed for projects that fall into "the valley of death" – the area between research and commercial application. For further information see the article *"Bridging the Valley of Death: Lessons Learned From 14 Years of Commercialization of Technology Education*" (Barr; Baker et al., 2009).
- **Crowdfunding:** For research on societal challenges that are often discussed in general public, crowdfunding is viewed as an interesting alternative funding option.

Funding of transdisciplinary research

For transdisciplinary research projects it is often difficult to find money. To change this, one stakeholder suggests setting up good examples of transdisciplinary research that show the benefits of the approach. However, to find funders for transdisciplinary projects is not the only difficulty; for researchers that include practitioners as equivalent partners into the whole research process, it is not easy to get ahead professionally and make a career. This should also be considered when trying to promote transdisciplinarity.

16.6 Annexes

Annex Ia: NKS interviews and workshop participants in Switzerland

NKS Interviews

nr	Name of the entity	Contact person	funder	end user	knowledge provider	national-regional-local authority	university/research institute	SME /consultant	business and industry	NGO	network	other	soil	sediment	water	land use-management
1	Federal Office for the Enviroment FOEN, Soil Section	Roland von Arx	1	1	1	1							1			
2	Federal Office for Spatial Development ARE, Section for Settlements and Landscape	Reto Camenzind	1	1	1	1										1
3	Soil Science Society Switzerland SSSS Bern University of Applied Sciences: School of Agricultural, Forest and Food Sciences HAFL	Stéphane Burgos		1	1		1				1		1			1
4	Zurich University of Applied Sciences, Research Group Soil Ecology Soil Science Society Switzerland SSSS Netzwerk Raumplanung [Network Spatial Planning]	Beatrice Kulli		1	1		1				1		1			1
5	Landscape Forum (Forum Landschaft) Head of knowledge transfer, National Research Programme "Soil as a Resource" (NRP 68) steiger texte, konzepte, beratung	Urs Steiger		1	1			1			1	1	1	1	1	1
6	Swiss Foundation for Landscape Conservation (SL)	Raimund Rodewald		1	1					1						1
7	Credit Suisse, Real Estate Research	Fabian Waltert		1					1							1
8	Swisstopo, Swiss Geological Survey	Christian Minnig	1	1	1	1							1	1		
9	Research Institute of Organic Agriculture FibL, Department of Socioeconomics	Robert Home			1		1						1			1
10	Swiss Federal Research Institute WSL, Soil Functions and Soil Protection	Jörg Luster			1		1						1	1		
11	Swiss Federal Institute of Aquatic Science and Technology EAWAG, Surface Waters, Sedimentology	Nathalie Dubois			1		1							1	1	
12	Ernst Basler + Partner AG	Daniel Baumgartner		1				1					1			1
13	Pensimo Management AG Privatdozent at the ETH Zurich, Department of Architecture	Joris van Wezemael	1	1			1	1	1							1
14	Schweizerische Vereinigung für Landesplanung VLP-ASPAN [Swiss association for spatial planning]	Lukas Bühlmann		1	1						1					1
15	Stadtbauamt Liestal [Building Authority of the city of Liestal]	Thomas Noack		1		1										1
16	Fachstelle Bodenschutz des Kantons Bern [Soil Protection Agency of the canton of Berne]	Wolfgang Sturny		1		1							1			1
17	Fachstelle Bodenschutz des Kantons Bern [Soil Protection Agency of the canton of Berne]	Andreas Chervet		1		1							1			1
18	Ecotox Centre, Sediment and Soil Ecotoxicology	Benoît Ferrari			1		1						1	1	1	
19	Ecotox Centre, Sediment and Soil Ecotoxicology	Sophie Campiche			1		1						1		1	
20	Ecotox Centre, Sediment and Soil Ecotoxicology	Carmen Casado-Martinez			1		1							1	1	
21	Swiss Society of Engineers and Architects SIA	Hans-Georg Bächtold	1	1	1						1		1	1	1	1
22	Agroscope, Soil Fertility and Soil Protection	Peter Weisskopf			1		1						1			1
23	Programme manager, National Research Programme "Soil as a Resource" (NRP 68)	Pascal Walther	1									1	1	1		1

NKS Workshop

nr	Name of the entity	Contact person	funder	end user	knowledge provider	national-regional-local authority	university/research institute	SME /consultant	business and industry	NGO	network	other	soil	sediment	water	land use-management
1	Federal Office for Spatial Development ARE, Section for Settlements and Landscape	Reto Camenzind	1	1	1	1										1
2	Zurich University of Applied Sciences, Research Group Soil Ecology Soil Science Society Switzerland SSSS Netzwerk Raumplanung [Network Spatial Planning]	Beatrice Kulli		1	1		1				1		1			1
3	Swiss Federal Institute of Aquatic Science and Technology EAWAG, Surface Waters, Sedimentology	Nathalie Dubois			1		1							1	1	
4	Fachstelle Bodenschutz des Kantons Bern [Soil Protection Agency of the canton of Berne]	Andreas Chervet		1		1							1			1
5	Fachstelle Bodenschutz des Kantons Bern [Soil Protection Agency of the canton of Berne]	Liv Kellermann		1		1							1			1
6	Ecotox Centre, Sediment and Soil Ecotoxicology	Sophie Campiche			1		1						1		1	
7	Swiss Society of Engineers and Architects SIA	Hans-Georg Bächtold	1	1	1						1		1	1	1	1
8	Agroscope, Soil Fertility and Soil Protection	Peter Weisskopf			1		1						1			1
9	Federal Office for the Enviroment FOEN, Soil Section	Ruedi Stähli	1	1	1	1							1			
10	ETH Zurich, Environmental Biology	Josef Zeyer			1		1						1		1	
11	HSR Hochschule für Technik Rapperswil, Institute for Spatial Development IRAP	Dirk Engelke			1		1									1
12	Agroscope, Swiss Soil Monitoring Network (NABO)	Reto Meuli			1		1						1			
13	AGRIDEA, Development of rural areas	David Bourdin		1	1						1					1

Annex Ib: NKS questionnaire template adapted for Switzerland

A. Interview information

Country: Switzerland

Name of INSPIRATION researcher:

Date of interview:

Place:

Name of person interviewed:

B. Introduction

i. Aims of INSPIRATION Introduction on the project

ii. Expert interviews Information on the interviews

iii. Anonymization of the statements All your statements will be made anonymous. However, we would like to mention your name as well as the name of your institution as participants of the study.

iv. Recording Are we allowed to record the interview?

C. Background information on the interviewee

1. Institution:

2. Position:

3. Are you working at…
   - ○ a governmental office
   - ○ an university or a research institute
   - ○ a Small or Medium Sized Enterprise (SME < 500 employees)
   - ○ in a big company
   - ○ a Non-Governmental-Organization (NGO)
   - ○ a network or an union

4. What is your expertize in the fields of spatial planning, land use and soil management?

D. Current land- and soil-relevant objectives

5. Main goals/research topics:
   a. **Business/policy:** Which are the 3-4 land- and soil-relevant main goals of your organization?
   b. **Science:** Which are the 3-4 land- and soil-relevant main research topics at your university or research institute?

6. Which are the most important land- and soil-relevant concepts, strategies, standards and documents your organization refers to and bases itself on?

7. Does your organization provide external research funding? Please give examples.

E. Knowledge needs and research gaps

8. Which societal challenges Switzerland is facing currently in the fields of spatial planning, land use and soil management?

9. Which new knowledge will be needed to tackle these societal challenges?

   [System knowledge, target knowledge and transformation knowledge]

   a. Where do you see knowledge needs in business and policy?

   b. Where do you see research gaps?

10. Which specific topics (knowledge needs and research gaps) should be included in the Strategic Research Agenda?

    a. Please elaborate the topic.

       Optional:

       1) *What exactly is the problem?*
       2) *What is the consequence if we do not act?*
       3) *Who can contribute to the improvement of the situation?*
       4) *How can the newly gained knowledge be effectively used?*

    b. How **important** is the topic? *[in the sense of "what happens if we don't act"]*

       - Very high importance
       - high importance
       - medium importance
       - low importance
       - no importance

    c. How **urgent** is the topic?

       - Very high urgency
       - high urgency
       - medium urgency
       - low urgency
       - no urgency

    d. Who wants to/should fund this kind of research?

    e. Which are the important documents underpinning this topic?

11. Which research agendas and research programs do exist that already today cover knowledge needs and research gaps in the fields of spatial planning, land use and soil management?

    a. Please name the relevant documents underpinning these agendas and programs.

    b. What are windows-of-opportunities to influence the setting of topics for these agendas and programs?

12. To what extent are you able to influence the setting of topics for scientific research agendas, -programs and -strategies in Switzerland?

F. Science-Policy-Interface

13. Which sources of knowledge do you use for doing your job?
    a. Scientific publications
    b. Other publications and reports
    c. Colleagues
    d. Experiences and examples from Switzerland
    e. Experiences and examples from abroad
    f. Media (print, radio, TV…)
    g. Conferences
    h. Research- or consultant projects ordered by your institution
    i. Internet
    j. Other, specify?.....

14. Use of scientific knowledge:
    a. **Business/policy:** When (and what for) do you use scientific knowledge in your job?
    b. **Science:** Which strategies do you adopt to make sure that the results of your research reach business and policy and are used by them?

15. To what extent (and where) are results from state-of-the-art scientific research integrated into policies and business in Switzerland? Please give examples.
    a. What goes well?
    b. What could be improved?

16. How could the knowledge transfer from science to policy/business be (further) improved?
    a. Improvement of communication?
    b. Other funding mechanisms?
    c. Other research approaches or other research goals?

17. *[Questions only to persons from the **non-science sector** (business and policy)]*
    Have you ever been involved in…
    a. the formulation of research questions or in doing scientific research?
        1) What went well?
        2) What could be improved?
    b. synthesizing scientific knowledge to feed into policy making/into your company?
        1) What went well?
        2) What could be improved?

18. How is the societal/political/economic impact of scientific research in the field of spatial planning, land use and soil management being assessed in Switzerland?
    a. What indicators are used?
    b. What goes well?
    c. What could be improved?

19. Which Science-Policy-Interface documents do you know? Please give examples.

G. Funding

20. Funding systems:
    a. How do you finance your activities and projects/your research (public/private)?
        1) Subnational
        2) National *[e.g. „Schweizerischer Nationalfonds“]*
        3) European *[e.g. „H2020“, „Interreg“, multilateral Programs as the „Joint Programming Initiatives“]*
        4) International *[e.g. „Belmont Forum“ etc.]*
    b. Do you know other funding schemes (public/private) that fund research in the field of spatial planning, land use and soil management, or could fund such research in the future?
        1) Subnational
        2) National *[e.g. „Schweizerischer Nationalfonds“]*
        3) European *[e.g. „H2020“, „Interreg“, multilateral Programs as the „Joint Programming Initiatives“]*
        4) International *[e.g. „Belmont Forum“ etc.]*
    c. Do you know websites or documents on these funding schemes? Which?

21. Are there areas of research and innovation that are not (yet) covered by current funding mechanisms and which would need new/different funding schemes? Which areas of research and innovation?

H. Vision

23. How do you see Swiss spatial planning, land use and soil management in the future? What is your vision?

I. Remarks, suggestions, examples

24. Did we forget something important? Do you wish to add something?

J. Ending the interview

25. Thank you for taking the time to participate in this interview!
    a. Would you like to be updated about the INSPIRATION progress by the online newsletter?
    b. Would you suggest anyone else who we should interview?
    c. We are organizing a workshop in November to consolidate the outcomes of the interviews and to prioritize the found knowledge gaps. Would you be ready to take part in this workshop on Friday, 13th of November 2015 in the afternoon?
    d. We write a report on the results of all the interviews – if you are interested we will send this report to you. For the report, we will make all your statements anonymous. But we would like to give your name and the name of your institution as participants of the study.

Annex Ic: NKS hand-out: INSPIRATION interview at a glance

INSPIRATION (Integrated Spatial Planning, Land-Use and Soil Management Research Action)

Information on the expert interview

If you wish to prepare yourself for the interview, we send you some information on the topics that are covered by the project and the main interview questions.

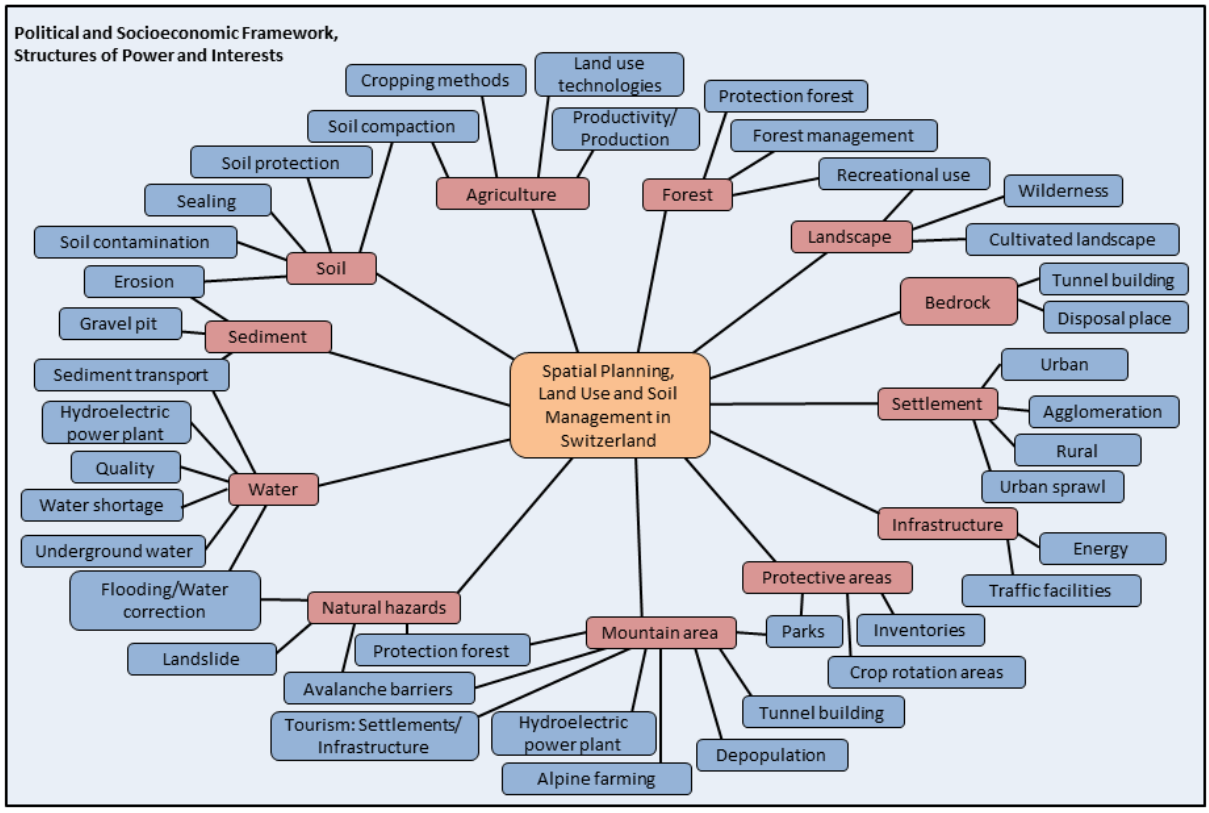
Aim of INSPIRATION

INSPIRATION is a European research project within the research program HORIZON 2020. The aim of the project is to find knowledge needs and research gaps in the fields of spatial planning, land-use and soil management. Within the project a strategic research agenda will be formulated and it will be showed how research in this field could be realised and funded.

Topics covered by INSPIRATION

The topics covered by INSPIRATION are very broadly spread. To visualise this, we developed a “Map of Spatial Planning, Land-Use and Soil Management in Switzerland” that shows, which topics are included in the terms spatial planning, land-use and soil management (red). In the blue fields we list examples, which specify the topics. The examples are not concluding, but will be complemented in the interviews.

Map of Spatial Planning, Land Use and Soil Management in Switzerland



Main interview questions

In the following you find the essential interview questions. When we talk of spatial planning, land-use and soil management, we always refer to all the topics visualized in the map above. The experts decide by themselves on which topics they can give information.

1. **Current land- and soil-relevant objectives**
   - Which are the most important land- and soil-relevant concepts, strategies, standards and documents your organization refers to and bases itself on?

2. **Knowledge needs and research gaps**
   - Which societal challenges Switzerland is facing currently in the fields of spatial planning, land use and soil management?
   - Which new knowledge will be needed to tackle these societal challenges?

3. **Science-Policy-Interface**
   - To what extent (and where) are results from state-of-the-art scientific research integrated into policies and business in Switzerland? Please give examples.
   - How could the knowledge transfer from science to policy/business be (further) improved?

4. **Funding**
   - Which funding schemes (public/private) do you know that fund research in the field of spatial planning, land use and soil management, or could fund such research in the future?

5. **Vision**
   - How do you see Swiss spatial planning, land use and soil management in the future? What is your vision?

We thank you for your support and are looking forward to the interview!

Annex II: Documents used for the Swiss desk study

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17. The Netherlands

Report by Linda Maring, Jos Brils

17.1 Executive summary

17.1.1 English version

INSPIRATION develops a strategic research agenda (SRA) on how land-use, land management and the soil-sediment-water (SSW) system can contribute to address societal challenges and meet societal needs. This is done bottom-up, in 17 European countries by consulting National Key Stakeholders (NKS) in interviews and in a national workshop. NKS originate from different organisations and have various backgrounds. The information provided by the NKS is complemented by a desk-study of the documents that the NKS suggested relevant for the scope of INSPIRATION. This procedure was also followed in the Netherlands. However, the workshop in the Netherlands was public and thus a broader audience then only NKS participated and contributed to that event.

Societal challenges

The Dutch NKS indicated several short or long-term societal challenges in relation to land use and the SSW system. These challenges are: Agriculture and food; Liveability of rural areas; Climate change; Water; Smart and healthy cities; Mobility and transport; Soil quality; Energy supply and Efficient use of resources.

Research needs were defined for each of these challenges.

Research needs

Agriculture and food

For agriculture and food the demand is determined by developments (from local to global) in the agricultural sector and consumer behaviour (trends in diets). Agriculture links directly to natural capital. What “quality of soil is good” for agriculture and what is the role here of biodiversity? Land management relates to “sustainable agriculture” and the possibility to combine functions in the rural area. The effect of land management can be used to shape and define “good soil quality” and “sustainable land-use” in order to support decision making.

Liveability of rural areas

The demand for biomass for different purposes is a main driver that influences the liveability of rural areas. Natural capital can potentially play a role in improving liveability but that role needs to be determined. Land management can add value to rural areas, e.g. by combining functions and by integrating agricultural land, nature and landscape management. The net impact of land management (e.g. on health and wellbeing) needs to be assessed to be able to improve the liveability of rural areas.

Climate change

This is a serious challenge for both urban (flooding, heath stress) and rural areas (salt intrusion, soil subsidence, wetter or dryer land). There are many opportunities to combine climate change with addressing other societal challenges. These opportunities should be investigated and optimized and the role in here of natural capital should be studied. Land management and better use of the SSW system, including soil organic matter (as an indicator), can contribute to climate change adaptation and mitigation. The net impact of climate change on land and different societal challenges as well as the effectiveness of different measures needs to be determined.

Water

Water is a very important challenge in the Netherlands. The current and future demand for different uses of land, surface water, groundwater and natural capital results in many challenges for land management. Research is needed to design and balance area-based groundwater management, management of water levels related to different land uses, water safety and water quality management. The effectiveness of water management and measures should feedback to land-use practices.

Smart and healthy cities

To maintain and design smart and healthy cities is a serious challenge. The demand on our cities depends on different future demographic and climate change scenarios. There is huge potential to use natural capital (green and blue infrastructures) to increase urban resilience and the quality of life in urban areas, but that potential should be further investigated and be applied in practice. Land management research should focus at interactions and combinations between natural and urban systems and 4D-planning. The net impacts of (new) threats and effectiveness of measures (ecoengineering, building with nature) needs to be assessed to be able to improve land management practices.

Mobility and transport

The demand regarding the ‘mobility and transport’ challenge is mainly determined by space availability and suitability of the SSW system to support infrastructure. The role of the subsurface to carry infrastructure, above ground and subsurface, is an important aspect. Spatial planning related research is mainly focussed at asset management methods and possibilities to combine infrastructure and ecosystem services. Net impacts related research should focus at the interactions between (above ground and subsurface) infrastructures and the SSW system.

Soil quality

The quality of soil should be regarded broader than only looking at chemical quality. It also encompasses the quality for a specific use. Soil quality research should try to combine this broader focus with other challenges such as land use changes. The role of natural capital is also a main topic for research: how can the natural system improve soil quality, both chemically, biologically and physically in relation different land use functions**?** Land management questions relate to managing (new) contaminants, governance practice, sustainable dredging, earth moving, and management of brownfields and landfills. Net impacts research should focus on risks for human health and ecosystems.

Energy supply

The desire for a specific energy mix depends on different scenarios. Natural capital should be mainly regarded for its potential for subsurface, renewable energy provision. Land management research should focus on spatial effects (including subsurface energy storage and transport) as a consequence of the selected energy mix and on the possibilities to combine different functions. Net impacts related research could be targeted towards predicting, mitigating and management of the effects of the use of different energy sources (winning and storage).

Efficient use of resources

The challenges regarding efficient use of resources encompass the societal need for resources (local-global), their availability or scarcity and how this is influenced by a circular economy including the possibilities to reuse materials. Natural capital should be mainly regarded for its potential to use the natural system for addressing these challenges and for closing cycles. Land management research should focus at determining and optimizing of the sediment balance, managing of the impacts of resource extraction on landscapes and at designing (new) land-uses for areas that became available after resource extractions (aboveground and in the subsurface: e.g. salt caverns). Net impacts realted research could be targeted to support decision making and to improve land management.

Cross-cutting topics

Some topics cross-cut the above challenges and thus is research on these topics beneficial for all challenges. These cross-cutting topics are:

- Governance: this relates to research on how to deal with “commons” such as soil. Research should focus on policy making and regulation, development of adaptive policy models, decision making, managing of game changers, dealing with uncertainty and stakeholder participation.
- The knowledge base of stakeholders: this relates to the stakeholder’s knowledge of the SSW system and land-use. A shared knowledge base enables stakeholder to engage in debates between science, policy and practice. Specific research topics are effective learning processes (learn from impacts to improve land management); sufficient information supply; awareness raising and education.
- Systems understanding: understanding of the functioning of the SSW system is a crucial topic to be able to use that system for addressing societal challenges. Specific research topics are the prediction and management of 4D effects of land use; the effects of interferences within the SSW system on different (temporal and spatial) scales; (indicators for) the resilience of the SSW system.
- Valuation of the SSW system: We need research focussed on the potential of the SSW system to provide ecosystem services in order to be able to use the SSW system to address societal challenges. Decision makers will benefit from new knowledge on how to valuate and balance costs and benefits of SSW related ecosystem services.

- Data and information: sufficient, readily available and good quality data are the basis for being able to address societal challenges. Also the role of big data should be explored here.
- Land-use: it is needed to develop a vision on future land-use in the Netherlands. This enables the prediction of land-use demands and this land management to anticipate on that. Specific research question are: what is the role of ecosystem services; what do we consider "optimal / sustainable" land-use, how can ecoengineering and building with nature practices improve land-use? Research should also consider land prices and ownership rights.

Science - policy/practice interaction

The difference between fundamental, strategic and applied research is broadly known and well understood in the Netherlands. The research focus is shifting towards applied research where fundamental research gest less attention. This is expressed as a concern by the Dutch NKS. The ability to influence research agendas varies among the stakeholders. However, many are involved in, or have the ability to join R&I agenda setting debates in the Netherlands. One NKS stated: "*To get something on the agenda is easier than to get it under attention*". Attention can be raised by linking research questions to societal challenges. Good examples and a good story work also very well: "*show & tell*". A research agenda should be coherent and well-designed and should integrate short as well as long-term research. However, unfortunately funding availability lags behind the availability of research agendas.

Funding possibilities

Many national, European and international funding possibilities were suggested by the NKS. There is significantly more budget available for applied research and there is a lot of attention for business cases in the Netherlands. However, designing and establishing of such cases is sometimes perceived cumbersome. There should remain attention for flexibility, innovation and seed money for good ideas.

Topics that are not or insufficiently covered within research programs and by funding possibilities are often the topics that are not directly linked to the primary tasks or core businesses of organisations. If there is no direct ownership, topics remain unaddressed, even though some of these topics may give us interesting insights and impulses for innovations. Such topics need a better "branding" in order to get funding.

Programming and financing of research and research policy in the Netherlands (and also in the EU) is often sectorial. This hampers integrated research and approaches. Active collaboration should be sought to break the silos.

17.1.2 Dutch version

INSPIRATION richt zich op wat landgebruik, landbeheer en het bodem-sediment-water systeem kunnen bijdragen aan maatschappelijke opgaven. Daartoe wordt een strategische onderzoeksagenda opgesteld. In 17 Europese landen hebben bureaustudies, interviews, workshops met stakeholders[40] vanuit bedrijfsleven, overheid en onderzoeksinstellingen plaatsgevonden om de maatschappelijke opgaven en bijbehorende strategische onderzoeksvragen helder te krijgen. Daarnaast zijn vragen gesteld over hoe kennis, beleid en praktijk interacteren en over de beschikbaarheid van financieringsinstrumenten voor onderzoek.

Maatschappelijke opgaven

In Nederland zijn diverse maatschappelijke opgaven voor korte en lange termijn benoemd door de nationale *key stakeholders* (NKS) waarbij landgebruik en het bodem-sediment-water-systeem een rol kunnen spelen. Deze opgaven zijn: Landbouw en voedsel; Leefbaarheid van het landelijk gebied; Klimaatverandering; Water; Slimme en gezonde stad; Mobiliteit en transport; Bodemkwaliteit; energievoorziening en Efficiënt gebruik grondstoffen.

Voor elk van deze maatschappelijke opgaven is ook de onderzoeksbehoefte gedefinieerd.

Onderzoeksbehoefte

Landbouw en voedsel

Bij landbouw en voedsel worden de onderzoeksvragen bepaald door ontwikkelingen (van lokaal tot mondiaal) in de agrarische sector en het gedrag van consumenten (trends in dieet). Landbouw is direct gelinkt aan natuurlijk kapitaal. Wat is een "goede bodemkwaliteit" voor de landbouw en wat is de rol van de biodiversiteit? Landbeheer heeft betrekking op “duurzame landbouw” en functiecombinatie mogelijkheden in het landelijk gebied. De effecten van landgebruik kunnen worden gebruikt om “goede bodemkwaliteit” en “duurzaam landgebruik” vorm te geven. Hiermee wordt besluitvorming ondersteund.

Leefbaarheid van het landelijk gebied

De vraag naar biomassa voor verschillende doeleinden is een bepalende factor bij deze uitdaging en bij landgebruik in het landelijk gebied. Natuurlijk kapitaal kan mogelijk een rol spelen bij het vergroten van de leefbaarheid van landelijk gebied. Deze rol moet nog worden vastgesteld. Met landbeheer kan waarde aan het landelijk gebied worden toegevoegd, bijvoorbeeld door functiecombinaties en door geïntegreerd beheer van landbouwgrond, natuur en landschappen. Het effect van landbeheer (bijvoorbeeld op gezondheid en welzijn) moet worden vastgesteld om zo de leefbaarheid van het landelijk gebied te kunnen beïnvloeden.

[40] Deze exercitie is parallel uitgevoerd met de update van de Nederlandse Kennisagenda Bodem en Ondergrond.

Klimaatverandering

Klimaatverandering is een serieuze uitdaging voor zowel het stedelijke (overstromingen, hittestress) als het landelijke gebied (verzilting, bodemdaling, vernatting en verdroging). Er zijn echter veel kansen om klimaatverandering met andere opgaven op te pakken. Deze moeten worden onderzocht en geoptimaliseerd, net zoals de rol van het natuurlijk systeem. Landbeheer en het betere benutting van het bodem-sediment-water-systeem (inclusief organische stof, als indicator) kunnen bijdragen aan klimaatadaptatie en -mitigatie. De impact van klimaatverandering op land en diverse maatschappelijke uitdagingen, en de effecten van diverse maatregelen moet worden onderzocht en vastgesteld.

Water

Water is in Nederland een belangrijke uitdaging. De behoefte aan verschillende functies van land, grond- of oppervlaktewater, nu en in de toekomst, en de rol hierin van natuurlijk kapitaal, resulteren in diverse uitdagingen met betrekking tot landbeheer. Onderzoek is nodig om goed vorm te kunnen geven aan gebiedsgericht beheer, peilbeheer gerelateerd aan verschillende landgebruiksfuncties, waterveiligheid en waterkwaliteitsbeheer. De effecten van waterbeheer en ingrepen moeten worden meegenomen in de landgebruikspraktijk.

Slimme en gezonde stad

Een slimme en gezonde stad behouden en vormgeven is een serieuze opgave. Wat we van de stad willen, is afhankelijk van diverse toekomstscenario's, waarbij demografie en klimaatverandering belangrijke aspecten zijn. Het gebruik van natuurlijk kapitaal (groene en blauwe infrastructuren) om de veerkracht en de leefomgevingskwaliteit in het stedelijk gebied te verhogen, heeft veel potentie, die onderzocht en benut moet worden. Onderzoek naar landbeheer kan zich richten op de interacties en combinaties tussen het natuurlijke en urbane systeem en 4D planning. Impacts van (nieuwe) bedreigingen en de effecten van ingrepen (eco-engineering, bouwen met de natuur) moeten worden bepaald om daarmee de landbeheerpraktijk te kunnen verbeteren.

Mobiliteit en transport

De vraag bij de uitdaging 'mobiliteit en transport' wordt vooral bepaald door de beschikbaarheid van ruimte en de geschiktheid van het bodem-sediment-water-systeem voor de functie. De rol van de ondergrond om infrastructuur te dragen (boven of onder de grond) is een belangrijk aspect. Onderzoek in verband met ruimtelijke ordening moet vooral worden gericht op 'asset' beheermethoden en mogelijkheden om infrastructuur en ecosysteemdiensten te combineren. Onderzoek naar de netto-effecten moeten worden gericht op de interactie tussen de (bovengrondse en ondergrondse) infrastructuur en het bodem-sediment-water-systeem.

Bodemkwaliteitszorg

Bodemkwaliteit moet breder worden gezien dan alleen chemische kwaliteit, het omvat ook de kwaliteit voor een specifiek gebruik. Bij bodemkwaliteit is het van belang om te kijken of er mogelijkheden bestaan om dit te combineren met andere uitdagingen zoals landgebruikveranderingen. De rol van natuurlijk kapitaal moet ook worden onderzocht: hoe kan het natuurlijke systeem de bodemkwaliteit verbeteren (zowel chemisch, biologisch als fysisch voor verschillende functies landgebruik). Onderzoeksvragen gerelateerd aan landbeheer moeten worden gericht op omgaan met (nieuwe) verontreinigingen, governance, duurzaam baggeren en grondverzet, en beheer van 'brownfields' en stortplaatsen. Onderzoek naar de effecten moet zich richten op de risico's voor de volksgezondheid en ecosystemen.

Energievoorziening

Hoe de energiemix eruit gaat zien hangt af van verschillende scenario's. De rol van natuurlijk kapitaal hierbij gaat vooral over de potentie die de ondergrond biedt voor bodemenergie. Landbeheeronderzoek kan zich richten op ruimtelijke effecten (inclusief ondergrondse opslag en transport) van de energiemix en op de mogelijkheden voor functiecombinaties. Onderzoek naar de effecten moet zich richten op het voorspellen, mitigeren en omgaan met effecten van het gebruik van verschillende energiebronnen (winning en opslag).

Efficiënt gebruik grondstoffen

De opgave efficiënt gebruik van grondstoffen wordt bepaald door de behoefte aan grondstoffen (lokaal-globaal), beschikbaarheid en schaarste en de rol hierbij van circulaire economie en mogelijkheden om materialen te hergebruiken. De rol van natuurlijk kapitaal hierbij gaat vooral over de mogelijkheden om het natuurlijk systeem in te zetten en om kringlopen te sluiten. Landbeheeronderzoek kan zich richten op het in kaart brengen en optimaliseren van de sedimentbalans, omgaan met de impacts van grondstoffenwinning en het ontwerpen van (nieuw) landgebruik op terreinen die beschikbaar komen door winningen (boven en onder de grond, zoals zoutcavernes). Onderzoek naar de effecten van grondstoffenwinning kan helpen bij besluitvorming en verbeteren van landbeheer.

Dwarsverbanden

Daarnaast zijn een aantal dwarsverbanden benoemd. Dit zijn onderwerpen die bij het onderzoek naar alle benoemde maatschappelijke opgaven van belang zijn. Deze dwarsverbanden zijn:

- Governance, hieronder valt onderzoek gericht op het omgaan met "*commons*" zoals bodem. Het gaat hierbij om beleid en regelgeving, adaptieve beleidsmodellen, besluitvorming, het omgaan met "*game changers*", het omgaan met onzekerheden en samenwerking tussen belanghebbenden.

- De kennisbasis van betrokkenen, hier staat de kennisbasis van de betrokkenen bij het bodem-sediment-watersysteem en landgebruik centraal. De kennisbasis is van belang zodat iedereen zijn of haar rol kan spelen in de interacties tussen wetenschap, beleid en praktijk. Effectieve leerprocessen (leren van impacts zodat landbeheer geoptimaliseerd kan worden), voldoende informatievoorziening, bewustwording en onderwijs zijn onderwerpen waaraan gewerkt moet worden.
- Kennis van de werking van het bodem-sediment-water-systeem. Het begrijpen hoe het bodem-sediment-water-systeem functioneert is cruciaal om dit systeem te kunnen benutten voor het aanpakken van maatschappelijke opgaven. De 4D-effecten van landgebruik en ingrepen in het bodem-sediment-water-systeem op diverse (ruimtelijke en temporele) schalen moeten kunnen worden ingeschat en ondervangen. Daarnaast is begrip van (indicatoren voor) de veerkracht van het bodem-sediment-water-systeem van belang.
- Waardering van het bodem-sediment-water-systeem. Onderzoek naar de potentie van het bodem-sediment-water-systeem om ecosysteemdiensten te leveren is nodig om het systeem te kunnen benutten om maatschappelijk opgaven aan te pakken. Kennis over het waarderen en het verdelen van kosten en baten van ecosysteemdiensten helpt bij besluitvorming.
- Data en informatie. Voldoende en beschikbare data van goede kwaliteit zijn de basis om te kunnen werken aan maatschappelijk opgaven. Hierbij moet de rol van "*big data*" worden verkend.
- Landgebruik. Een visie op het toekomstige landgebruik in Nederland is van belang om de wensen en landbeheeropgaven goed te kunnen inschatten. Wat de rol van ecosysteemdiensten hierbij? Wat verstaan we onder optimaal, duurzaam landgebruik? Hoe kan eco-engineering en bouwen-met-de-natuur landgebruik verbeteren? Aspecten zoals grondprijzen en landeigendom moeten worden meegenomen in onderzoek rond dit onderwerp.

Interactie tussen wetenschap en beleid / praktijk

Het verschil tussen fundamenteel, strategisch en toegepast onderzoek is in Nederland welbekend. De focus van het onderzoek verschuift hier in de richting van toegepast onderzoek, waardoor fundamenteel onderzoek minder aandacht krijgt. Dit wordt door de NKS als een potentieel probleem gezien. De mogelijkheid om onderzoeksagenda's te beïnvloeden verschilt per persoon. Echter, velen zijn betrokken en kunnen meepraten over de agendering van onderzoek. Een NKS merkte echter op: "Iets op een agenda krijgen is makkelijker dan iets agenderen". Door onderzoeksvragen aan maatschappelijke opgaven te koppelen krijgen ze aandacht. Ook goede voorbeelden dragen daaraan bij. Een onderzoeksagenda moet coherent en goed worden neergezet, waarbij zowel korte en lange termijn onderzoek een plaats moet krijgen. Echter, er zijn momenteel meer agenda's dan financiering voor onderzoek.

Financieringsmogelijkheden

Er zijn tal van nationale, Europese en internationale financieringsmogelijkheden beschikbaar, waarbij het meeste budget beschikbaar is voor toegepast onderzoek. Er is veel aandacht voor business cases in Nederland. Die zijn echter soms lastig op te zetten. Er moet aandacht blijven voor flexibiliteit, innovatie en “seed money” voor goede ideeën.

Onderwerpen die niet of onvoldoende financieringsmogelijkheden hebben of niet terugkomen in onderzoeksagenda ’s, zijn de onderwerpen die niet rechtstreeks verband houden met de primaire taken of core business van organisaties. Als er geen direct eigenaarschap is, blijven dit soort onderzoeksvragen vaak liggen, hoewel deze vaak "cross-border" onderwerpen interessante inzichten en impulsen voor innovatie kunnen geven. We moeten deze onderwerpen beter “*branden*” om ze gefinancierd te krijgen.

Programmering en financiering van onderzoek en onderzoeksbeleid in Nederland (en ook in de EU) zijn nog vaak sectoraal ingestoken. Dit belemmert integraal onderzoek. Om dit te doorbreken moet proactief samenwerking worden gezocht.

17.2 Methodology followed

This national report is INSPIRATION deliverable 2.5 - The Netherlands. In the Netherlands, the exercise to collate research needs was held in parallel to an update of the Dutch knowledge agenda for soil and subsurface[41]. For this update, societal challenges were defined and research questions were listed by a group of representatives of municipalities, water authorities, provinces, the national authority and research institutes: professionals and policymakers that encounter knowledge gaps in their daily practice.

For INSPIRATION 16 full interviews with NKS and 3 additional interviews (two more NKS and a funding-expert from the national government) wer conducted. The NKS that were interviewed are presented in Annex I. Information on interview questions (in English) is provided in deliverable 2.3[42] and in Annex 1 of chapter 1.

The desk-study was based on documents as suggested by the NKS (Annex II).

With the interviews and the desk-study, the discriptions of societal challenges and the research questions under the societal challenges were completed, sharpened and improved.

These research questions were presented and discussed in a 2-day national workshop, held in November 2015. Next to the NKS, a broader group of representatives from end-users, funders, researchers and policy makers from different organisations and fields were invited for the first day of workshop (the overview of attendees and the program are presented in Annex IIIa and IIIb respectively). On the second workshop day, the NKS further elaborated the results of day 1.

All results were combined in a draft for deliverable 2.5 and sent to the NKS for review. In annex I it is indicated which NKS reviewed which parts of the report (4th colom "*reviewed*"). Also two members of the INSPIRATION international advisory board were asked to, and thus reviewed (part of) the draft deliverable.

Al reviews were integrated in this resulting document. The research questions that thus have been obtained are presented (in Dutch) in annex IV.

[41] http://www.rwsleefomgeving.nl/onderwerpen/bodem-ondergrond/ondergrond/kennisagenda/

[42] Brils J, Maring L, Darmendrail D, Dictor MC, Guerin V, Coussy S, Finka M, Bal N, Menger P, Rehunnen A, Zeyer J, Schröter-Schlaack C, Villeneuve J, Gorgon J, Bartke S (2015): Template for national information collation. Update 1 version as of 02.07.2015 of deliverable D2.3 of the HORIZON 2020 project INSPIRATION. EC Grant agreement no: 642372, UBA: Dessau-Roßlau, Germany. Available on: http://www.inspiration-h2020.eu/sites/default/files/upload/documents/d2.3_update1.pdf (Annex IIa).

17.3 Research and Innovation (R&I) needs

INSPIRATION's scope is on land use, land-use changes and soil management in the light of current and future societal challenges. When reading this section it is important to realize that the research topics originating from these challenges and needs are very much interlinked. The soil-water-sediment system[43] reacts on land management and land management is dependent on the soil-water-sediment system. Changes and disturbances have effects on different spatial and time scales (Figure 1).

Figure 1: Societal challenges linked to the soil-sediment-water system, land-use and land management, as formulated by NKS in the Netherlands.

In some cases, research questions are categorized under a specific topic while they would also fit under another topic. To prevent duplication, choices were made.

[43] Soil-sediment-water system or natural system or ecosystem: A dynamic complex of plant, animal, and micro-organism communities and the non-living environment interacting as a functional unit. http://www.inspiration-h2020.eu/page/glossary-0

17.3.1 Societal challenges and needs

Many of the societal challenges that the EU has formulated in Horizon2020 are recognized in the Netherlands. These challenges are becoming more important looking at the future. Therefore research is needed to tackle these challenges. Figure 2 presents the relation between the societal challenges in the Netherlands and the challenges as formulated by the EU.

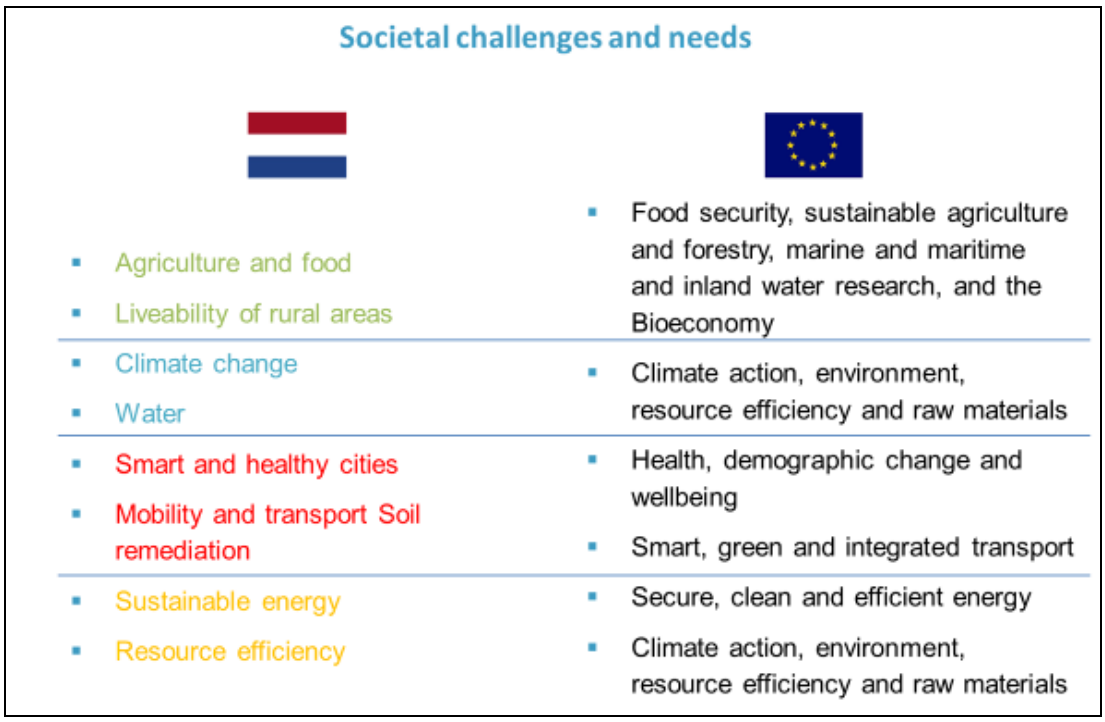

Figure 2: The societal challenges and needs as formulated in the Netherlands and EU

These societal challenges and needs in the Netherlands:

- Sustainable agriculture and food are important challenges in the Netherlands. Agriculture is very intensive and productive in the Netheralnds. This has repercussions on the quality of soil and water and nature. This contributes to the difficulties to be able to comply with regulations such as the Water Framework Directive (WFD). The worldwide need for more food production, together with other land-use functions (including the need for bio-based materials) puts pressure on our resources, including land. Keeping agricultural practice sustainable, i.e. to maintain the production function without damage elsewhere or later, asks for a healthy and well-functioning soil-sediment-water system.
- Liveability of rural areas: By nature the landscape mirros the (qualities of) soil and subsurface. Due to intensified land-use and increased technical possibilities, this is changing. Economic developments and political choices constantly influence land-use in the Netherlands. Landscapes become more alike and people move away from remote, rural areas. Although many positive trends are seen in the rural area, liveability needs to be improved by adding value, using the natural soil-sediment-water system and land management.

- Climate change is a serious challenge in the Netherlands, both for urban areas (flooding, heat stress) and for rural areas (salinization, subsidence, floods and droughts). This asks for solutions in terms of climate change adaptation and mitigation. Land-use planning and the use of the soil-sediment-water system have a high potential to contribute to these solutions.
- Water: Part of the Netherlands lies below sea level. This makes water safety an important challenge. Next to water safety, sufficient water supply for drinking, irrigation and process water, now and in the future, is recognized as a serious challenge. For that reason strategic groundwater reserves are taken up in a Dutch strategy for the subsurface. Quality and quantity aspects are all of importance in water management. It is a constant puzzle where soil-sediment-water system, land-use and (land and water) management interact closely.
- Smart and healthy cities: Urban population increase and climate change pose great pressure on the liveability of cities. The pressure on, and changes in urban areas ask for a vision on smart and healthy cities. Thus to ensure liveability in the future and avoid damage and unnecessary costs. Smart and sustainable urban planning is the key to an economic and ecological vital and attractive city. Therefore, sustainable use of the soil-sediment-water system is needed. It important to know how the soil-sediment-water system functions in, and below urban systems. Smart urban planning pays attention to the metabolism of a city, circularity and the interaction between the urban system and the natural soil-water system.
- Mobility and transport: When transporting people and goods, above and subsurface infrastructure and facilities around them are needed. Important here is the interaction with the soil-sediment-water system to maintain the function of the infrastructure. A different category is the subsurface transport of substances such as gas, (waste) water and oil. These are transported by different kinds of pipes and electricity is transported by cables. A very important challenge here is subsurface spatial planning.
- Soil quality The soil remediation operation of the Netherlands is coming to an end. The next step is the management phase. The major responsibility for soil is being decentralised. Awareness increased about the fact that soil quality is more than complying with standards for chemical substances. Soil quality is also important regarding the sustainable functioning of ecosystems (ecological, chemical and physical quality). Soil remediation not related to spatial development is becoming redundant and is replaced by (area-based) sustainable land management (includes soil protection). A strong and innovative soil (research, consultancy and advice) sector remains significant when dealing with new and historic contamination, complying with national and European regulation and sustainable brownfield regeneration.

- Sustainable energy supply: Sustainable and secure energy supply is high on the political and societal agenda. The Netherlands provide partly their own energy by using subsurface fossil fuels, i.e. natural gas and oil. The winning of natural gas in the North of the Netherlands has adverse effects (earth quakes) which influence societal perception on (deep) subsurface winning activities and the use of fossil fuels. The energy supply is in transition: the amount of renewable energy sources increases. The subsurface can play a role in this transition. The spatial planning of the deep subsurface ((unconventional) winning, storage) will be part of the Dutch strategy for subsurface planning. Using the soil-sediment-water system for energy purposes asks for a thorough understanding of the natural system, to avoid adverse effects. The energy transition also has spatial impacts, aboveground and in the subsurface, that need to be considered when making choices.
- Resource efficiency: Many natural resources are becoming scarce, putting this issue internationally high on the agenda. The Dutch subsurface supplies natural resources such as sand, gravel, clay, salt, fossil fuels and water. The shallow extraction of resources leaves a mark on landscapes and space that can be reused or redeveloped. Resource extraction also highly influences the soil-sediment-water system and its ability to provide ecosystem services. This asks for system understanding. Different parties focus on resource efficiency by investing in circular economy, the 'food-water-energy' nexus and possibilities to enable the re-use of (secondary) building material (soil, sediment). Also companies and industries make their resource use part of their long-term business strategies.
- Cross-cutting themes: several cross-cutting themes need to be addressed when working on the above (and other) societal challenges:
  - Governance;
  - The knowledge base of stakeholders;
  - System knowledge/understanding;
  - Valuation of the soil-sediment-water system;
  - Data and information;
  - Land-use.

  Also for these cross-cutting themes knowledge and instruments are needed.

17.3.2 Topics / research needs to include in the SRA

Different topics and research needs related to the societal challenges are obtained from the interviews, desk-study and national workshop. Hereafter the main topics are introduced and for each topic the main research questions are summarized under INSPIRATION themes “demand”, “natural capital”, land management” and “impact”. The documents, research agendas, research programmes underpinning these topics are presented in Annex II.

NL-1: Agriculture and food

World’s population will grow with more than 2 billion towards more than 9 billion people. This will increase the need for food production. Towards 2050 the agricultural production needs to grow worldwide with 60%. Also urbanisation has taken large quantities of agricultural land. The need for more food, together with other land use functions put pressure on our resources, including land. To keep agricultural practice sustainable: maintain the production function without damage elsewhere or later, asks for a healthy and well-functioning soil-sediment-water system.

The ambition to move to a biobased economy puts pressure as well on agricultural land. In the bio-economy, renewable resources such as algae, crops (residues), organic waste are used as food fodder, building material, chemicals, plastics, energy and fuel. This lowers the dependency on fossil natural resources such as natural gas and oil, lowers CO_2 emissions and contributes to circular economy. This shift to biobased will increase the demand for biomass. This can partly be met by residues and waste but the other part must be delivered by an even higher (global) agricultural production. In the Netherlands, agriculture is already very intensive and productive, so the biomass should come from elsewhere when the Netherlands want to invest in biobased products. This can cause severe shifts in nutrient availability disrupt nutrient cycles worldwide (surplus in importing lands and losses in exporting lands). The current European diet is characterised by a high intake of meat, dairy products and eggs. Livestock production in the EU is the driver of around 80% of the nitrogen losses from agriculture. These losses cause a number of environmental problems, including eutrophication. Halving the current consumption of meat and dairy in the EU would achieve reductions of around 40% in agricultural nitrogen losses and 25% to 40% in greenhouse gas emissions from agriculture[44]. There are different types of farms in the agricultural sector[45]: the specialized rural farm (mainly family farms, agriculture, dairy or horticulture), the semi-industrialized farm (greenhouse farming, intensified cattle farms) and urban oriented farms (multifunctional).

[44] Westhoek et al., 2015
[45] RLI, 2013

A higher demand for biomass asks for higher productivity. This intensifying of production has repercussions on the quality of soil and water and nature. This e.g. contributes to the difficulties to comply with regulation such as the Water Framework Directive[46] (WFD) and the Nitrates Directive[47].

Ground bound agricultural production systems need productive soil: that are fertile, have a good physical structure, can retain water, bind carbon in humus and repel diseases. In the following narrative this is discussed.

Narrative: What is a good soil for sustainable agriculture and how can sustainable agriculture contribute to good soils?

What is a good soil for sustainable agriculture and how can sustainable agriculture contribute to good soils? These questions start many discussions. At the one hand we can look at the natural suitability of soils for a certain agricultural function. At the other hand can land use management and agricultural practices can improve soils. A vital soil can deliver ecosystem services to its full potential. To achieve and maintain a vital soil, sustainable agricultural land use practices are needed.

There is not just one, but multiple models for “doing it right”. Ingredients are:

Knowledge of the soil (processes) and the relation with management practices are indispensable. Both scientific knowledge and knowledge from the farmers’ experience are important here.

Which sustainable agricultural practices and business cases are effective? Circular processes and resource efficiency can contribute here. There is a need to lower emissions and utilize nutrients more efficiently. “Prevention is better than cure”: lower inputs of or alternatives for pesticides.

Insight in (external) drivers: Farmers have to deal with many external influences and boundary conditions, such as regulation and economical drivers. How can they be used in a positive way for long term sustainable productivity instead of short term high economic yields?

Next to the farmers, also other parties in the chain from “soil to mouth” are important: retailers, consumers, the large purchasing agents for supermarket chains. Further stakeholders are the authorities (EU to local), research organisations, seed-producers, NGOs and financial parties such as bank investors,.

[46] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

[47] Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources

Specific research questions:

Demand

- How become stakeholders aware of the importance of good soil quality for food safety and quality and their role in this matter?
- What can we do in the Netherlands to achieve sustainable use of soils and recover soil quality here and elsewhere and, with that, contribute to the UN-Sustainable Development Goals?
- What do trends en developments in the agricultural sector, such as scaling up short-term business cases, agriculture that follows market trends instead of the possibilities of the soil-sediment-water system, entail for soil and subsurface (possibilities and threats for the use of the soil-sediment-water system)?
- What are trends in diets and what do they entail for soil and water use and health. How can people be convinced to change to a diet with less animal proteins?
- Who are the winners and losers in the food chain in the transition to a more healthy (for people and the environment) diet and sustainable agriculture? How to take care of the losers? What can be the role of the common agricultural policy (CAP) in this transition?

Natural capital

- What is a healthy soil? And, more specific: What is the condition of the soil (soil life, structure, quality, amount and quality of the soil organic matter etc., integrated fysical-chemical-biological) connected to the agricultural function and other ecosystem services (water storage, biological control, soil fertility, productivity, etc.)?
- How can natural processes being used to recover degraded soils and maintain healthy soils?
- What is the effect of good soil quality for emissions of nitrogen and phosphate from agriculture and horticulture?

Land management

- How can the soil-sediment-water system being used in an optimal way to make agriculture sustainable?
- What knowledge of the soil-sediment-water system is needed to transform agriculture to a resource efficient sector? Both on a regional and global scale. This is related to closing cycles and the footprint of agriculture products.
- Which factors determine if the suitability of soils for agriculture is taken into account in spatial and economic decisions and which optimizes are possible?
- How can we value soil and biodiversity as natural capital for agriculture and translate this to earning models?

- How can agriculture and other functions such as water and nature management, energy production and climate adaptation and mitigation being combined, using the knowledge of the ecosystem?
- How can farmers being stimulated to implement (new or improved) agricultural methods in such a way that low productivity is avoided, soils are recovered and dependency on external resources is decreased?
    - How to design and/or close nutrient cycles?
    - How to utilize biological residues of production changes in agriculture to contribute to circular economy, and an improvement of soil quality?
    - How to manage soil organic matter effectively?
    - What can precision agriculture contribute to more awareness of soils?
    - How can traditional agriculture such as crop rotation being combined with modern agricultural insights?
- How can we deal with, or avoid threats such as soil compaction, microbial risks from pathogens in the soil, antimicrobial resistance, soil subsidence and salinization?
- How can we translate existing knowledge of soil biodiversity to actions for farmers to improve soil biodiversity?
- How can we implement the Nitrates Directive and the Water Framework Directive in such a way in the Netherlands that farmers are stimulated to manage the soil-sediment-water system in a sustainable way?

Net impacts

- What is, on a short and long term, the result of conscious management of soil fertility?
- The global development of the standard of living (more or less consumption of animal protein, choice for organic food) has effects on agricultural practice. What does this mean for land use in the Netherlands and footprint elsewhere? What are the risks of land degradation? Is policy needed?
- What are effects of agricultural methods on the sustainability of agriculture and improvement of soil quality?
- What are effects of agricultural practice for eutrophication of coastal zones, groundwater quantity and quality and climate on a global scale?

NL-2: Liveability of rural areas

By nature the landscape mirros the (qualities of) soil and subsurface. Intensified land-use and increased technical possibilities alleviate the limitations posed by soil conditions. Economic developments and political choices have always influenced the land use in the Netherlands, but globalisation leads increasingly to uniform production requirements and standard landscapes. In rural areas scale enlargement and intensification of production, e.g. in horticulture and pig farming, is common. Dairy farmers partly intensify and another part d-intensifies. Many agricultural family-farm based businesses are sold to larger enterprises by lack of succession.

In remote rural areas (for Dutch standards), a decrease in facilities and employment is seen. Young people move away, villages are shrinking. Incidents, such as the Q-fever disease even further decline the popularity of rural areas. On the other side, in metropolitan and peri-urban regions, the rural is a very popular area for commuters' residence. Other positive examples can be mentioned as well: farmers investing in sustainable energy production; or a mix of functions such as care or education.

This all influences the liveability of these areas. There is a need to develop a vision on the rural. Rural regions need an attractive mix of land use functions. The liveability needs to be supported by multifunctionality: recreational value, natural value, attractively of the area for residence or business. The main question is here, how can we improve the liveability of rural areas by making optimal and sustainable use of the natural soil-sediment-water system and land management, duly incorporating natural and cultural heritage values and economic and social factors determining the location of a business?

Specific research questions:

Demand

- How can we improve the quality of life in rural areas by making the best use of the soil-sediment-water system and land management, taking into account natural and cultural values and economic and social factors that determine the location of businesses and individuals?
- How can the demand for regional biomass (for bioenergy) offer opportunities to stimulate the construction and maintenance of landscape elements?

Natural capital

- Is it important for the liveability of rural areas (Dutch identity) to show the significance of soil and subsurface as the basis of characteristic landscapes (including geological values, archaeology, geomorphology)? And if so, how do we return the 'readability' of the subsurface characteristics in the landscape?
- How can geological, cultural and biological values above and below ground level being expressed in social and economic values?

Land management

- Can economic and social-cultural scenario studies that combine different land uses to an attractive and livable rural area being developed? How can such multifunctional land use improve economy and ecology?
- What are the true costs and benefits of land use in rural areas, who benefits, who pays the cost, and how can this be fairly distributed?
- How can the Programmatic Approach to Nitrogen (PAN) be utilized to improve land use and the liveability of the rural area
- What is the role soil for health?
    - What is the role of soil, sediment and water in the spread of infectious diseases from animals to humans and to other animals (zoonoses such as Q-fever)?
    - What is the role of soil, sediment, water in the spread of antibiotic resistance?
    - What is the role of soil in the spread and risk of (new) contaminants such as medicines and nanoparticles?
    - What is the relationship with land use and safety in rural areas? How can these risks be reduced by soil management and farming methods?
- To what extent does the development in peri-urban areas to care farms, nurseries, agricultural recreation and therefore potential exposure to different substances, an increase or decrease in public health?
- How can agriculture and other land uses strengthen the soil-sediment-water system in rural areas and allow for sustainable agriculture as a function?
- What knowledge and measures are available when converting agricultural areas to nature, avoiding drastic measures such as excavation (to reach proper nutrient levels, water quantity)?
- How can farmers be stimulated to increase the contribution to the (soil) biodiversity and nature?
- How can we position ambitions for the soil and subsurface in the rural area in the Environment and Planning Act and its instruments (such as the “environmental visions”)? What knowledge of the soil-sediment-water system is needed?
- What factors influence decisions about land use in rural areas and how can the soil-sediment-water system be involved in spatial planning and land use?
- What does the soil-sediment-water system contribute to spatial quality in spatial developments such “Ruimte voor de Rivier” (“space for the river”)?
- How do can the users of land and groundwater in an area be involved in realizing clean groundwater and healthy soil for agriculture and nature?

- How can existing tools be enforced and / or are new tools needed to maintain and improve the liveability of rural areas on the basis of the local natural system and socio-cultural characteristics, focusing on function combinations?

Net impacts

- What land management measures are effective in improving the quality of life in rural areas and achieving sustainable nature (evaluation with pilots, exchange knowledge and experiences in "agro communities")?

NL-3 Climate change

Climate change is seen as a serious challenge in the Netherlands, both for urban areas (flooding, heat stress) as for rural areas (salinization, subsidence, floods and droughts). This asks for solutions in terms of adaptation to and mitigation of climate change. Land use planning and the soil-sediment-water system have a high potential in these solutions.

In urban areas is smart planning, making use of the soil-sediment-water system (blue and green structures), needed to make climate proof and resilience cities. In rural areas it is in some cases needed to change functions to adapt to new circumstances (e.g. saline crops). Spatial planning is an instrument for coping with effects of climate change: such as restructuring canals and rivers, creating use of space for fresh water retention.

Part of the adaptation strategy is awareness. Stakeholders need to be made aware of the chances to make alliances to meet the challenges posed by climate change. This can be done both by using the soil-sediment-water system and by combining them with other societal challenges, such as energy need, a more sustainable agricultural sector, and smart and healthy city development. Stakeholders can take different measures and the question is here how many small scale solutions can contribute on a larger time and spatial scale to climate change adaptation.

Another solution is climate change mitigation. In the Netherlands carbon capture and storage (CCS) in empty natural gas fields is seen as a promising, but still very costly solution.

It is important that public and private parties know their possibilities to act within the climate adaptation and mitigation policy.

There is awareness on climate change as a societal challenge, but the role of the soil-sediment-water system in this discussion can be made more explicit. Organic matter can be the linking theme. This is worked out in a short narrative:

Narrative: The role of soil organic matter (SOM) at climate adaptation and mitigation

Can SOM be used in when speaking about the contribution of the soil-sediment-water system to adapt to and mitigate climate change in the same way as CO_2 does in the climate debate?

When we looking at mitigation: we see that bad land management leads to emissions of CO_2 and other greenhouse gasses. Peat soils degrade, resulting in soil subsidence and a decrease of SOM and water storage potential of these soils. When looking at adaptation, water retention of soils can be improved when the land is managed in the right way. This is important when dealing with dryer summers and more intense and frequent rainfalls due to climate change.

Next to water storage, also water purification capacity, soil fertility and structure are influenced highly by SOM. SOM is also a measure and boundary condition for biodiversity.

The amounts of SOM are highly dependent on land use practice. For example, the use of crop (residues) for biofuels and fibre production for biobased products have as result a decreasing SOM content in soils.

In short: SOM is an important aspect for many soil functions and can be a link between the soil-sediment-water system and societal challenges such as climate change.

By combined research on the role of SOM and its functioning, more than one challenge can be addressed. Choosing SOM as a central theme can be a driver for alliances in research and implementation of the results in pilots in natural and rural areas, improving the role of the soil-sediment-water system and land management practices. Important stakeholders are farmers, industries processing compost and manure, authorities and researchers from different research fields, nature management organisations, fertilizer and chemical industry, banks, food and drinking water industry.

In short: research on SOM as the link between soil-sediment-water system and climate change is relevant. The loss of SOM is mentioned as one of the major soil threats and connects to the UN sustainable development goals[48]. The role of SOM plays on different scales: from parcel to global. Putting it on the research agenda asks for action to improve awareness on the role of SOM when dealing with societal challenges and to link existing research programs to each other.

[48] Eg. UN-SDG 2.4: *By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality*

Specific research questions:

Demand

- What opportunities exist for alliances to tackle climate change challenges together with other societal challenges (such as energy and the smart and healthy city) using the potential of the soil-sediment-water system?

Natural capital

Elaborate how the soil-sediment-water system can contribute to challenges posed by climate change. Specific research questions:

- What opportunities do soil and subsurface offer for climate adaptation and mitigation (optimising land use to lower greenhouse gases, increase organic matter content, decrease the loss of organic matter, increase water storage potential, water safety, stability of soil, etc.)?
- Is organic matter the point of reference for climate change for the soil sector?

Land management

Elaborate the role of land use and management by coping to challenges posed by climate change (for both adaptation and mitigation strategies). Specific research questions:

- What can land use and management of the soil-sediment-water system contribute to tackling challenges related to climate change? Is this contribution fully known?
- What action perspectives for soil and subsurface do public and private parties have for climate adaptation and mitigation policy?
- How can the use (adaptation) of the soil-sediment-water system be adapted to impacts of climate change?
- What measures in the soil-sediment-water system are most effective to comply with the commitments to reduce greenhouse gas emissions (mitigation)?
- What are the costs and benefits of climate adaptation and mitigation policy for the soil-sediment-water system?
- How can many small scale solutions contribute on a larger time and spatial scale to climate change adaptation and mitigation?
- What measures for the soil-sediment-water system and land use are effective under what circumstances in the context of climate adaptation and mitigation?

Net impacts

What are the effects of climate change on the soil-sediment-water system, its functions, and land use and management? Specific research questions:

- What is the effect of climate change on:
    - Soil quality, soil characteristics, soil biodiversity, soil processes, soil subsidence and ecosystem services?
    - The use of the soil-sediment-water system and land?
    - Invasive soilborne pathogens?
    - Pests due to a lacking frost period, resulting in the need for (new) pesticides ?
- How can effects of climate change on the soil-sediment-water system be monitored (natural capital, health, ecosystem)?
- How to avoid / deal with effects of climate change (soil subsidence, water management (flooding, dehydration, salinization), heat stress, changing land use, etc.)?

NL-4: Water

The Netherlands are a “water land”, a low delta, partly situated below sea level. Knowledge of the soil-sediment-water system is for centuries an important key for our economy.

The Dutch are known for their hydraulic engineering against floods. Making use of soil-sediment-water system, natural processes and land management can decrease costs for engineering and leads to better environmental quality and prevention of damage. In the Dutch water management this already is implemented in the program ‘Space for the river’ (‘Ruimte voor de rivier’) and the Delta Program ('Delta Programma').

Apart from managing the water in terms of safety (lowlands versus sea level rise), there are many more water management issues. (Ground)water levels are managed in relation to land use functions. For agriculture, water levels are lowered in many locations in the Netherlands, sometimes with detrimental effects such as soil subsidence and degrading peat areas, leading to CO_2 emissions, or local water shortage and excess. In urban areas low groundwater levels can cause rot on wooden fundaments of houses, while high groundwater levels cause damage and nuisance.

Groundwater is the most important source for drinking and industry water in the Netherlands. It is microbiological reliable and mostly well protected from outside influences. Sufficient water supply for drinking, irrigation and process water is, now and in the future, recognized as a serious challenge. For that reason strategic groundwater supplies are taken up in the Dutch strategy for subsurface planning “STRONG”. How to make decisions between different uses of groundwater (next to drinking water also functions such as irrigation, ATES) is subject of discussion. The quality and quantity of (ground)water directly are important to support land use functions and they also influence the soil-sediment-water system and its capability to deliver ecosystem services. However, (historical and new) contaminations put the quality of the groundwater under pressure, while climate change and soil sealing in urban areas influence the recharge of groundwater.

(Ground)water is a connecting topic, relevant on different scales and a connection between rural and urban areas. Many stakeholders are involved in different ways and dependant on good water management (policy). Therefore, collaboration and knowledge exchange are crucial. The (ground)water in the Netherlands is very decisive and is managed thoroughly. It is a constant puzzle where soil-sediment-water system, land use and (land and water) management interact closely. This topic has a very strong relation with climate change

A short narrative is given to elaborate the connection between themes and the strong link between policy and practice.

Narrative: soil subsidence and groundwater level management

The main driver for this narrative is the question: How can we use pilots during policy-making to avoid mismatches between policy and practice? As example we take soil subsidence and the management of groundwater levels to support specific land use functions. The province wants in this example function agriculture, which asks for a groundwater level of 60 cm below surface level. Even when the water authority wants to facilitate other, more flexible functions, it is obliged to lower the water level for the agricultural function. This practice is not sustainable, causing soil subsidence and oxidation of peat which causes increased CO_2 and methane emissions.

Soil subsidence and salinization by unsustainable land and water management cause continually higher costs to maintain the current land use functions. This situation cannot continue. Costs will become too high or damage will occur because is an end to what the soil-sediment-water system can bear. This tipping point can also become a chance: it asks for an open discussion and adaptive attitude from all stakeholders. This asks for education and awareness, alternative land use functions or land use management and different forms of collaboration. Knowledge from the soil-sediment-water system in relation to land use management practice is essential. Both scientific knowledge as local knowledge from the farmers and water managers should be combined. Stakeholders are water authorities, farmers, municipalities, provinces, NGOs, but also the stakeholders such as the recreational sector, project developers and groundwater dependent industry can be involved. The water authorities can have a leading role in the area process.

Specific research questions:

Demand

- How can water tasks, such as drinking water supply at this moment and in the future, be ensured and what does this mean for the soil-sediment-water system and strategic groundwater resources?

Natural capital

- How can the condition of the soil-sediment-water system in total be determined and / or evaluated? And what does this condition mean for the ecosystem services that can be delivered?

Land management

- What opportunities do exist for public and private parties to involve the soil-sediment-water system in their water tasks? And are they aware of these opportunities?
- How can land and water management be designed starting with the balance between the soil-sediment-water system and water tasks (safety, drinking water, agriculture, nature, industry, Water Framework Directive objectives, etc.) and with all stakeholder taking responsibility?
- How can area-based qualitative and quantitative groundwater management be designed?
- Which factors determine in the Netherlands whether active groundwater level management is administratively, technically and financially promising and to what extent?
- How can essential processes and functions of the soil-sediment-water system be implemented to regulate the hydrological cycle?
- Which measures (including eco-engineering) using the soil-sediment-water system are applicable, when and by whom, to optimise the hydrological cycle?
- What is optimal groundwater level management for a location in relation to land use functions and tasks (such as preventing subsidence and rot of wooden piles versus agriculture)?

Net impacts

- To what extent is the local soil condition determining for the influence of water on the soil-sediment-water system? And can this knowledge be translated into generic measures? Which water characteristics influence local soil conditions and to what degree?
- What is the significance of an intervention in the water system for the sustainability balance of the total soil-sediment-water system?
- How do interventions and the resulting changes in the soil-sediment-water system affect other areas such as agriculture and spatial planning?

NL-5: Smart and healthy cities

The number of people in cities increases worldwide. In 2020, it is expected that 70% of the world's population will live in urban areas. This increase, together with the effects of climate change, poses great pressure on the liveability of cities. The pressure on and changes in urban areas ask for a vision on smart and healthy cities, to ensure liveability in the future and avoid damage and unnecessary costs.

Smart and sustainable urban planning is the key to economic and ecological vital and attractive cities. Urban areas can be characterised as complex systems because they have to house different functions like living, working and recreation that are connected by a good infra and mobility system. These functional systems also need to be considered in the existing social and cultural assets and potentials on the one hand and the contemporary pressures on these systems coming from densification and climate change.

To reach the ambition of a city that performs smart, is health and attractive, sustainable use of the soil-sediment-water system is needed. The pressure of densification and climate change needs special care for the available space for green, water and recreation that competes with space for "hard" uses such as offices, housing and (subsurface) infrastructure. Soil sealing is seen as a serious threat for the soil quality and use of ecosystem functions, such as water storage capacity, cooling of the city, biodiversity, productivity for green. A central question is how sustainable use of the soil-sediment-water system can become a self-evident aspect of urban planning and design. The possibilities of soil-sediment-water system for different urban challenges need to be seen and used. Following the natural geomorphology for spatial planning, is a start: prevent building in spaces that are easily flooded or on the beginning of slopes to allow cool air to flow into the city at night.

The quality of urban soils, nature and green are essential within a healthy and smart city. Building with nature and the implementation of ecological concepts contribute to a liveable city. Therefore it is of importance to know how the soil-sediment-water system functions in and under the urban system, which processes are there, how they interfere, and how ecosystem services can be used in a sustainable and optimal way. This is as mentioned before a very complex system that should be approached as such. We need, while gaining understanding in this complex system, to leave room for now still unknown solutions, strategies and collaborations.

Smart urban planning pays attention to the metabolism of a city, circularity and the interaction between the urban system and the natural soil-water system. The need for a stronger link between soil-sediment-water system and urban planning is described in the following narrative.

Narrative: start with soil-water-green in urban areas

We need to start with soil-water-green in urban planning. The natural and urban systems have a very strong relation and they need to be matched in a better way to make resilient, climate and future proof cities.

When making bad decisions in spatial planning this has in many cases a direct reverse effect: reverse environmental effects, objectives (climate) are not met, direct nuisance or damage, social effects. The effects together can cause a downward spiral, ending up in non-functioning, unattractive, underused urban areas. Even temporary green is better than no land use function at all. It gives value: “Have you ever seen a tree with graffiti?”

To give the soil-sediment-water system a “self-evident” place within urban planning some aspects need to be addressed:

Understanding: considering soil, water and green in urban areas is needed. They are an integral part of cities. Water and green are more than just a place for recreation. They also deliver other services. Show the possibilities of these services.

Valuation of the soil-sediment-water system: the value of the soil-sediment-water system should be made explicit. A lot of money is now spent on fighting symptoms of bad planning or technical solutions. Implementing water and green are not a debit in urban maintenance, but a valuable asset. Next to direct value, also the value of use, perception and future value should be assessed. Benefits also directly contribute to citizens in terms of avoided damage, wellbeing, health, etc

And perspectives for action: how can you use the soil-sediment-water system for more than “just” recreation. Think here in terms of functional green and water. Use the full potential of the services the natural system offers. (Eco-)engineering support redeveloping the city in a better way.

Knowledge of the soil-sediment-water system is needed to be able to use ecosystem services: what do we have and how can we use it.

Also recognition that the soil-sediment-water system is a system. Trees and groundwater flows depend on it.

The soil-sediment-water system is important on different scales. Next to local “solutions”, green and blue structures in a city are improving the cities climate and have a connecting function for flora and fauna. An urban area can be a harbour for biodiversity. Where rural areas have less species, the urban area gives a variety of habitats and contribute to important ecosystem services such as pollination and repression of pests and diseases. A well-functioning soil-sediment-water system adds long-term value to urban areas!

Stakeholders are citizens, authorities including politicians, water authorities, economical and urban development departments of municipality / province (in relation to ground ownership, land as a resource, land recycling, circular economy, SMEs and businesses, research and educational institutes.

Specific research questions:

Demand

- How do stakeholders become aware of the competition between the services of the soil-sediment-water system and the uses of subsurface space and the importance of involving both in decision making?
- How can we use scenario studies to anticipate future developments in urban areas?
- Which functions can be combined (in space / time) or reinforce each other in urban areas and which are competitive or make other functions impossible?
- How do we respond positively in terms of knowledge and innovation in the constantly new challenges that the urban soil-sediment-water system poses?

Natural capital

- What can the soil-sediment-water system contribute to circular cities (design and close cycles)?
- What is the value (monetizing / benefits for society) of the urban soil-sediment-water system and its services?
- Which soil processes are important for the delivery of services by the urban soil-water-sediment system (natural attenuation contaminations, water purification, climate buffering, prevention of heat stress, lower fine particulates in the air) and (how) can the functioning of the urban soil-water-sediment system be improved?

Land management

- What perspectives are there to involve the soil-water-sediment system in finding solutions to the challenges in urban areas?
- What impact have demographic and economic trends (decline and growth, land ownership) on the use and management of the soil-water-sediment system?
- How can soil and subsurface be balanced against other (environmental) topics (such as: water, safety, air, noise, ecology, economy, finance, spatial quality and societal challenges) in the development and management of u rban areas and how do soil and subsurface contribute to those other interests?
- How can the soil- sediment-water system be used when tackling challenges in urban areas? For example by:
    - Contribution of soil and subsurface to the transition of the urban water system
    - Contribution to climate-proof cities
    - Contribution to the energy supply of the city
    - (Ecological) concepts for sustainable land use planning, cycles
    - Better alignment of spatial planning of surface and subsurface

- What are opportunities for geo- and eco-engineering in urban areas?
- How can 4D planning (x, y, z, and t) be achieved with a balance between use of the soil-sediment-water system and the subsurface space in urban areas?

Net impacts

- Which (new) threats to the quality of the urban soil-sediment-water system can be expected in the coming decades and what costs do they involve?
- How does the soil-sediment-water system interact with the (intended) land use?
- What is the impact on health and environment quality of the (non) use of the urban soil-sediment-water system and its quality?
- What are the (measurable) effects of ecological and building-with-nature concepts, spatial planning based on green-blue structures and the use of ecosystem services to the societal challenges in urban areas?
- What are the benefits (to society) of using the urban soil-sediment-water system, how can costs benefits be distributed and is it possible to control costs in time and per stakeholder (mutual gain approach)?
- In what way can trade-offs be made between the soil-sediment-water system and the artificial urban system?

NL-6: Mobility and transport

Increased population density goes hand in hand with increased demand for mobility. This is not just transport of people, but also of utilities and transport of goods. This asks for (above and underground) infrastructure. For transport of people and goods this means railways, roads, waterways and infrastructural facilities around them, such as parking garages, stations and transfer points for goods. Important here is the interaction with the soil-sediment-water system to maintain the function of the infrastructure. A different category is the, mainly subsurface, transport of substances such as gas, (waste) water, oil. These are transported by different kinds of pipes. Electricity is transported by cables. Also these cables and pipes have some aboveground facilities connected to them such as electricity substations. An important challenge here is the subsurface spatial planning. Urban soils are spaghetti of cables and pipes. Old cables are not automatically removed, in many cases their location is unclear and there are not always rules on how to arrange cables and pipes in the subsurface. Also cables and pipes are influenced by the local circumstances of the soil-sediment-water system (both chemical and physical). In terms of asset management this can be very determining.

Specific research questions:

Demand

- What is, in the context of sustainable transport, the role of the subsurface for infrastructure networks (from main to minor infrastructure)?
- What factors and arguments can be used when making decisions on the construction of aboveground or subsurface infrastructure? Is preserving the qualities of the soil-sediment-water system a factor? How can these arguments be used when making trade-offs?

Land management

- What is the condition of subsurface infrastructure and what this mean in terms of replacement and removal of unused cables and wires?
- What techniques can be developed for sustainable civil engineering (building with nature, building on soils with low carrying capacity, nuisance-free civil engineering at the surface and in the subsurface)?
- What innovations are possible for managing, measuring and monitoring of subsurface infrastructures?
- What function combinations in road construction and maintenance and ecosystem services are possible?

Net impacts

- What are interactions between soil-sediment-water system and construction of, and existing, aboveground and subsurface infrastructure, now and in the future?
- Do interventions for the purpose of mobility and transport disturb the balance between the potential of the soil-sediment-water system and societal needs? How can these

disturbances be characterized and what does this mean for the quality of the soil-sediment-water system?

- What are positive and negative interactions between subsurface infrastructural developments and the soil-sediment-water system, and what can we learn from these interactions for future infrastructural developments in the subsurface?

NL-7: Soil quality

In the next few years, the Dutch soil remediation operation comes to an end. Many sites are investigated and remediated, including most of the urgent sites. The next step is the management phase, aimed at contaminations that cannot be excavated, and that have a risk to spread. This phase focuses on innovative management of these sites, e.g. on the application of different in-situ techniques and risk-, area-based management of contaminated groundwater. The soil protection act and all underlying instruments will be integrated in the Environment and Planning Act. Expectations are that the Environment and Planning Act will be empowered in 2018.

Currently, the major responsibility for soil (and soil includes groundwater) is being decentralised. In the Environment and Planning Act, “care for good soil quality” will be integrated in “care for the environment”. There is now more awareness that soil quality is more than complying with standards for chemical substances. It is also a measure for the sustainable functioning of ecosystems (ecological, chemical en physical quality), “fitness for use” and soil protection.

The link with spatial development is vital to the future of soil remediation in the Netherlands, as new ways of soil usage will initiate additional funding for remediation activities, especially if these can be combined with another land use, e.g. aquifer thermal energy storage (ATES). Soil remediation unrelated to spatial development is becoming redundant and is replaced by sustainable land management. The main transitions in soil management and the scope for soil quality are:

- from central (national government) to decentralized (municipality)
- from sectorial (soil) to holistic (environment)
- from protection to sustainable use
- from soil remediation to land management
- from standardizing (comply with standards) to ambitions
- from clean to fit for use
- from chemical quality to “overall” quality
- from controlled and known contaminants to new contaminants and threats
- from current use to future use

This is all work in progress. Although the research needs is changing, it is important to maintain the knowledge base on soil remediation in the Netherlands. A strong and innovative soil sector remains significant. Dealing with historic contamination is still on the agenda, mainly in terms of organisation and financing. Also new contaminants pose possible risks. In practice, it can be very difficult to comply with national and European regulation. Sustainable transformation from brownfield to productive land is a challenging topic. This all asks for research efforts.

Specific research questions:

Demand

- How can soil quality management and care be connected to other topics such as climate adaptation, reuse and redevelopment of brownfields?
- How can soil protection contribute to the protection of strategic groundwater resources?

Natural capital

- Which (new) contaminants remain a (potential) risk to health (drinking water) or ecosystems?
- What entails the presence of substances alien to the system for the quality and resilience (biological control) and other qualities and functions of the soil-sediment-water system?
- How do soil, sediment and water and the substances inside interact (soil-sediment-water system)?
- What is the potential of the soil and subsurface to produce medicine or for natural attenuation of contaminants and how can this potential be deployed?

Land management

- How do we deal with (new) contaminations in groundwater and drinking water (measuring, monitoring and remediating, fitting it into the existing structure of the management of clean and slightly contaminated soils)?
- How can the "governance" of soil quality care be improved in terms of organization, after-care, professional commissioning, organization, law enforcement and supervision?
- What tools are needed to support the new soil quality care (including soil protection)?
- How can contaminated land / remediation be combined with other activities and contribute to area ambitions?
- How can dredging and earthmoving become more sustainable?
- How can the reuse of brownfields (economic, social, cultural) be encouraged?
- How can landfills be considered in land management and regional planning?
- Which (new, innovative, sustainable, (cost) effective) remediation and monitoring techniques can be further developed?

Net impacts

- How to assess risks of changing use of soil, water and land connected with the quality (more unsealed soils, swimming in canals with clean water, but contaminated sediment)? And what do these risks mean in relation to the societal needs?
- How can we integrate risk assessment of soil and groundwater contamination in risk assessment for the overall environment?
- How can results (efforts) of soil quality care (continuous improvement) be monitored (which indicators)?

NL-8: Energy supply

Sustainable and secure energy supply is an important condition for the prosperity in our country and it is high on the political and societal agenda.

The Netherlands provide partly in their own energy through indigenous subsurface fossil fuel production (natural gas and oil). Part of the electricity is produced in the nuclear plant in Borssele. These resources are finite and result in CO_2 emissions to the atmosphere, thus increasing the concentration of greenhouse gasses which has consequences for global climate. For the last 50 years the Netherlands has been self-sufficient in the production of natural gas and also exports a considerable annual volume. This has been very beneficial for the State budget, but most fields are in decline and the expectation is that the Netherlands will be a net gas importer within 5-10 years. In addition, lack of societal acceptance for subsurface activities starts to become more and more dominant in the energy discussion. An example is the impact of tremors in the North of the Netherlands induced by extraction of gas, which causes a further reduction of annual production.

At the moment, the energy supply is in transition, and although the current share of renewable energy is with 5-6% almost the lowest in the EU, the amount of renewable energy sources increases. The aspiration is that in 2030 9- 53% of the energy resources used in the Netherlands are renewable (consisting of wind, bio and solar energy). other sources can be recycled industrial heath, hydro power and energy recovery from waste. Both the 'Renewable Energy Directive' and the development of a biobased economy will lead to an increased demand for biomass as a source for energy. (The consequences are further elaborated under agriculture and food.)

The subsurface can still play a role in the energy transition by supplying sustainable energy. via aquifer thermal energy systems (ATES), and geothermal energy.. These are however not the only opportunities that the subsurface offers. Subsurface storage of CO_2 (CCS), or the storage of natural gas produced abroad in empty gas fields or storage of radioactive waste in salt caverns are subject of investigation. Although momentarily not a popular subject, also unconventional gas winning (shale gas) is one of the alternatives to derive natural gas. The spatial planning of activities in the deep subsurface (winning, storage) will be part of the Dutch strategy for subsurface planning "STRONG".

The Netherlands have an intensively developed near-surface infrastructure for energy transport and has ambitions to become the "gas roundabout" of Europe. This also requires thorough spatial planning, taking into account local chemical as well as physical shallow subsurface conditions (see also mobility and transport).

In short: using the soil-sediment-water system for energy purposes asks for thorough system knowledge, in order to avoid and/or mitigate reverse effects. The energy transition has spatial impacts, both aboveground and in the subsurface, which need to be considered when making choices.

Specific research questions:

Demand

- How can a good discussion be organized on the desirability of the various existing and new energy functions in the (deep) subsurface (geothermal energy, shale gas, gas storage, etc.) and how to create public support?
- How can choices be made between different types of energy production (necessity, sustainability, costs and benefits, risk impact and acceptance)? Which assessment method is suitable and widely applicable?
- How can a positive business case be made for the use of 'new' energy functions that make use of the?

Natural capital

- What potential has the subsurface in the transition towards sustainable energy supply? What does the energy transition entail for the use and functions of and in the subsurface?

Land management

- How can decisions in spatial planning be made in relation to energy functions (production, transport and storage) in the subsurface or aboveground (interference - competition - exclusion of functions and effects of interventions and / or use horizontally and vertically and through time))?
- How can we better employ the potential of the subsurface for sustainable energy?
- What are opportunities for function combinations (eg. ATES - remediation of groundwater)?
- How can energy be stored and transported efficiently and sustainably using the subsurface and which technological knowledge is needed?
- How can negative effects / consequences (renewable, irreversible, manageable) for different types of energy production be mitigated?
- How can the roles and collaboration of the market, governments, research organisations and citizens be optimized for new energy functions in the subsurface?

Net impacts

- What impact has the energy mix on surface and subsurface in terms of land use, effects (earthquakes, soil subsidence), safety, management of groundwater resources, etc.?
- Which interactions between soil-sediment-water system and energy production exist at different spatial and temporal scales (quantity, chemical quality, physical, geotechnical, microbiological)?
- What is the impact of "new" energy functions on the soil-sediment-water system and what does this entail for the soil-sediment-water system and societal challenges?

NL-9: Resource efficiency

Many natural resources become scarce. There is a worldwide trend of increased consumption due to population increase and higher living standards. Because of these developments, sustainable use of resources (including land!) is high on the agenda in in the Netherlands as well as in Europe and the world (examples: UN Sustainability goals[49], Resource efficient Europe[50], Land as a resource[51], Circular Economy Strategy[52]).

The Dutch sub-surface supplies resources such as sand, gravel, clay, salt, oil and natural gas, soil and geothermal energy (see sustainable energy supply) and water (see water). The shallow extraction of resources (peat and brown coal in the past, currently still sand, clay and gravel) influence landscapes strongly. Extractions (shallow and deep extraction such as salt) also leave space that can be reused or redeveloped. Resource extractions highly influence the soil-sediment-water system and its ability to deliver ecosystem services[53]. This asks for system knowledge. The changes in landscape and its effects need to be considered and mitigated.

Authorities on different levels focus on resource efficiency by investing in circular economy, the food, water, energy nexus and possibilities to facilitate the re-use of (secondary) building material (soil, sediment). Companies and industry incorporate their resource use in their long-term strategy by reducing the use of natural resources (re-use resources and technical innovations to lower in- and outputs). Moreover the dependencies of industries on their surroundings (especially water availability) are important factors determining the location of a business. The reuse of building materials is not only interesting for the building sector. The use of secondary building materials reduces waste production and avoids the use of natural resources. Making this cost-effective is the challenge.

The application of sediment a resource needs better regulation internationally. For sediment a short narrative was given.

Narrative: shortage of sediment – so what

Worldwide natural sediment transport is seriously obstructed by human interventions such as damming, river training, dredging and dike construction. Thus some sites are overloaded, while others experience a shortage. Excess of sediment hampers the transport function of river systems (both water and navigation). Moreover, reduction of drainage, results in risks of flooding.. Sediment shortage causes river bed incision and bank erosion, resulting in loss of land and undermining and collapsing of bridges and dikes. It also deteriorates fluvial ecosystems by draining and drying out floodplains and wetlands. Furthermore, delta's, wetlands, lagoons and estuaries need sediment to be maintained. The following research question can be defined for this theme:

[49] https://sustainabledevelopment.un.org/?menu=1300
[50] http://ec.europa.eu/resource-efficient-europe/
[51] http://ec.europa.eu/environment/land_use/index_en.htm
[52] http://ec.europa.eu/environment/circular-economy/index_en.htm
[53] Although rare earth materials and uranium are of importance for the Netherlands, and the demand here has effects on other locations where they are won, they are not taken up in the research questions.

Demand: Describe the role of sediment in river systems and quantify the societal costs and benefits of the amount of sediment present in the system, taking into account cross boundary issues as well as costs and benefits for local communities
Why: This underpins the importance of this issue, i.e. provides the arguments to see sediment management as a true societal challenge.

Natural capital: Gain better insight in sediment related ecosystem services (ES) especially where they can help address societal challenges and thus to raise awareness of the key role that sediment plays (i.e. ES provided) for society.
Why: This is the key to raising awareness of the societal importance of sediment.

Impact: Improving the process understanding – and improvement of sharing of that understanding – of the connectivity of sediments between Land-Soil-Sediment-Water Systems and of the interaction of erosion, sediment transfer, deposition, remobilization and yield (i.e. sediment balance).
Why: The better we understand, share and exploit the available understanding of the functioning of natural river-delta-sea systems – and especially the role of sediments (balance) therein – the more effective our sediment equilibrium restoration measures will be.

Land management: Developing/testing/demonstrating 'Working-with-Nature' kind of solutions to get sediment from overloaded sites (such as reservoirs) to areas where there is a sediment shortage (or use for solving other societal challenges, like soil subsidence).
Why: This is probably one of the most urgent and rewarding challenges to address.

Specific research questions:

Demand

- What is the necessity of resource exploitation for the long term (future scenarios for use of resources taking into account self-sufficiency, geopolitical dependency, national and international scarcity, footprints, circular economy and transition to sustainable energy)?
- How do we contribute to reuse of materials / circular economy?
    - Is a "material passport" effective? For what purposes? What to consider when designing materials for reuse?
    - How can sediment and (fertile) soil be reused in a safe and cost-effective manner?
    - What is the potential from landfill-mining and other waste products in the subsurface?
    - What technological knowledge is required in the recovery of resources from waste and contaminated soil?

- What determines the choice of the use of primary and secondary materials in the construction and civil engineering sector?
    - How can secondary building materials be better used (higher in the chain) to reduce mining of primary building materials?
    - What secondary building materials are released in the future (eg by demolition) and what is their impact on the mining of primary building materials?

Natural capital

- What can the soil-sediment-water system and land use contribute to circular economy, where ecology and economy enhance each other eg. by closing cycles of soil and water?
- What is the sediment balance on different scales? Where are shortages and surpluses? What are the effects on society?
- How can the soil-sediment-water system contribute to lower the input of resources in an urban, industrial and agricultural setting?

Land management

- How do we make spatial trade-offs between different land uses (including extraction of resources) and how can the use of ecosystem services be optimized?
- How can we strengthen the landscape with, or share in revenues from resource exploitation?
- What decisions need to be taken in the soil-sediment-water system, land management and laws and regulation to better cope with sediment quality and quantity?
- How can we salt caverns be used in a safe way?

Net impacts

- What are interactions between soil-sediment-water system, landscape and resource exploitation?

NL-10: Governance

Asking more holistic questions, as is needed when tackling societal challenges, requires for understanding of, and sometimes changes in the governance system. Policies and regulation are currently quite sectorial, although this is changing in the Netherlands with the implementation of the Environment and Planning Act (expected 2018). This requires other or additional arrangements and collaboration.

Dealing with **safety and health** issues is important within the scope of INSPIRATION and poses challenges in the field of governance. For example: new and intensive land use functions in the shallow or deep subsurface can cause risks for the soil-sediment-water system and safety for health and environment. It is important to know who is responsible for which aspects in terms of safety. In some cases this can be the (national or regional or local) authority. In other cases this is the citizen.

Dealing with uncertainties when working with the soil-sediment-water system also poses challenges in terms of governance. The effects of interferences in the soil-sediment-water system are not always predictable and/or known. Also trends as climate change, intensification of agriculture, demographic changes cause insecurities. By listing the insecurities it is possible to anticipate on them. Risk management is an instrument that is suitable for developing robust policy as well as robust spatial plans and management. Risk-based and adaptive practices are valuable here.

Specific research questions can be all clustered under **Land management**:

- Soil as “common”: how can we effectively implement air-water-soil when tackling societal challenges if we do not own them?
- Which policy choices and regulation are impediments to realize sustainable soil and land use in practice?
- How can we convert from a control model to an adaptive model when managing space?
- How do we rank priorities of subsurface activities when they are competing for the same space?
- How to deal with “game changers” (new policy, knowledge, scandal, disaster etc.)?
- What knowledge is needed to develop risk management and related measures?
- How can we effectively work on holistic issues such as area-based groundwater management (with both generic and specific knowledge, “T-shaped knowledge” and with attention for made-to measure activities and the right processes)
- How can we use pilots when making policy to avoid mismatches between policy and practice?
- How can we bring the application of green-blue structures from paper to practice?

NL-11: Knowledge base

This topic includes the knowledge that stakeholders have or need to use land and the soil-sediment-water system in a sustainable way. When working on societal challenges, both specialist knowledge is needed as well as the skills to connect this specialist knowledge to the broader context of the challenges. Both the science-policy-interface and securing and exchanging knowledge are important aspects. Researchers and end-users together need to translate challenges to research questions en science to practice. The client should be able to understand what he/she needs to know, where to find it and how to phrase research questions. Specific research questions can be all clustered under **Demand**:

- How do businesses, governments and citizens keep the knowledge about the soil-sediment-water system and land use at a sufficient level (knowledge management, training, collaboration)?
- How does new knowledge land in policy?
- How can we learn from experiences and knowledge from abroad?
- How to organize effective learning processes?
- How are participants with "bottom-up" initiatives provided with the correct information (eg. urban agriculture / soil quality) and how is ensured that the knowledge from these initiatives reaches others?
- What is needed for awareness and education about the soil-sediment-water system (eg. international year of soil, soil and water education, GLOBE[54])?

[54] http://www.globe.gov/do-globe/globe-teachers-guide/soil-pedosphere

NL-12: Soil-sediment-water system knowledge

The soil-sediment-water system may contribute to tackling societal challenges. System knowledge is needed to know the soil-sediment-water system's potential to deliver services or functions and to maintain and restore the quality of these. System knowledge enables us to predict and assess the effects of disturbances and measures. It is important to be aware that "the system" has besides a qualitative dimension also a spatial and a temporal dimension. Effects can appear (much) later, or on other places than when the disturbance took place. Specific research question are:

Natural capital

- How does the soil-sediment-water system work and what does this mean for different types of land use?
- What is the connectivity within the system Chemical, biological, physical?
- How can the soil-sediment-water system being monitored to obtain a better understanding of the functioning of the system?

Land management

- What is the combined effect of small scale disturbances and measures on the total functioning of (water /subsurface) system. What does this mean for the potential of the soil/water system to contribute to addressing societal challenges?
- How to deal with scales and delineation of systems in relation to system knowledge?

Impacts

- How does the natural system contribute to societal development?
- What are the 4D (x,y,z and t) effects of land use and interferences in the natural system?
- What is the flexibility of the soil-sediment-water system in relationship to disturbances?

NL-13: Valuation of the soil-sediment-water system (ecosystem services)

The subsurface provides goods and services to man and the society and thereby represents a natural capital. Examples of these ecosystem services are clean drinking water, soil fertility and climate regulation. The economic value of these services delivered in and on the subsurface is important in valuation of our natural capital. Ecosystem services are a way to translate the biological, physical, chemical and socio-cultural value of the soil into values that may be used in cost-benefit analyses etc.. One of the research questions that re-appears under the different societal challenges irols how to value this natural capital. Criteria such as scarcity (global and local) and permanent versus temporary damage to the soil-sediment-water system play a role in the discussion. Underneath a short narrative is given on sustainable use of ecosystems.

Narrative: sustainable use of our ecosystems

Ecosystems deliver goods and services that are of crucial value for mankind, and should therefore be managed in a sustainable way. To achieve this, it needs to be explained what natural capital and ecosystem services are and what they mean to us.

Natural capital and ecosystem services can be used in assessing land management options such as functions in groundwater, resource use (sand, gravel etc.). Different scenarios should be investigated for a long term period.

Better understanding of the soil-sediment-water system is the basis. We can make use of the existing knowledge and develop new knowledge where needed. Many stakeholders can benefit of knowing and using natural capital and ecosystem services. National and regional authorities, business and industry (agriculture food, chemical industry, drinking water companies etc), water authorities, NGO’s etc.

There are already examples of public-private partnerships that work together and are take care of the environmental quality of an area to ensure continuity of business and interests of other stakeholders.

Using natural capital and ecosystem services pays off and is therefore interesting for many parties. Making the benefits explicit helps to get the focus of stakeholders on this subject.

Specific research questions:

Natural capital

- What is the (main) contribution of the soil ecosystem to natural capital and which are the system characteristics determining this?
- How can we optimize or recover system characteristics features?
- Is organic matter such a system characteristic (role of organic matter for soil functions: soil fertility, infiltration, carbon storage, filtration, soil resilience)?
- What is the significance of soil (life) for societal challenges?
- What can be an indicator for good soil quality and can it used for communication, monitoring and threshold value?

Land management

- How can the ecosystem be used in a sustainable way (from "to knowing what it has to offer," implementation through building concepts with nature concepts and eco-engineering, to ending use and recovery)?
- What are the possibilities for ecosystem services and how to value, optimize and cash these possibilities?
- How can companies / industries provide services with their soil-sediment-water system / land surface for the surrounding area?

NL-14: Data and information

The availability of reliable and up-to-date data is crucial when making spatial plans and working on the soil-sediment-water system. The data can be about the state and functioning of the soil-sediment-water system and the functions that are already in the subsurface (ATES systems, cables and pipes, archaeology etc) These data should be enclosed in a way that they are available on the right moment in a format that connects to the tasks of the user (eg. decision making in spatial planning).

With new media and technologies, enormous amounts of data become available. By combining and analysing of these data, it is possible to come to new understanding, concepts and strategies. Big and open data offers for soil and subsurface potentially many opportunities. Use of data has also some points of attention such as privacy, advisability to make data public, formats, reliability, semantics and correct use. Specific research questions are:

Land management

- What means big data for the field of the soil-sediment-water system and land use, for different stakeholders?
- How to get a better match between / unambiguous information within national portals such as the “information houses” at the “avenue of the environment”, and “atlas natural capital” (informatiehuizen aan de laan van de leefomgeving en atlas natuurlijk kapitaal (ANK)?
- How can we improve data(availability) for monitoring and modelling?
- How can we improve recording, exchange and use of data of the soil-sediment-water system on a national and European level?
- How can data of the soil-sediment-water system be translated into information that helps in the decision making process?
- What is the scale of information needed for proper land management?
- What can observatories (landscape observatory, soil observatory) contribute in terms of usable data and knowledge?
- How to enclose the data and information outside the “basis registration subsurface” (BasisRegistratie Ondergrond BRO) (nature, water, climate, soil biology, etc.)?

NL-15: Land-use

Land use aboveground and the biological, chemical and physical status of the subsurface influence each other. This extends to the visible, known or unknown heritage values of the land. It is necessary to get more insight in these influences to be able to make spatial choices and to tune land use and the natural and cultural system in a sustainable way.

On a larger scale, there is a need to investigate how land ownership and economic drivers influence the land use and land management in the Netherlands. For urban areas themes such as “land grabbing”, urban sprawl, and therefore subsurface themes such as soil sealing are of importance. Soil sealing is seen as an important soil threat, which has a substantial degrading effect on the natural subsurface system. For rural areas landownership and economic drivers are largely determining how the land is managed (see topic NL-1 agriculture and food). At this moment a territorial vision of future land use (Omgevingsvisie) in the Netherlands is being prepared. This vision should address the distribution of urban and rural areas, the preferred location of the various land use functions, including farming systems, and the required role of subsurface functions and ecosystem services in relation to land. To develop such a vision, the position of the Netherlands within Europe and the world is of importance, in relation to food, feed and fibre markets, but also in relation to landscape characteristics and attractiveness, both for residents and visitors and newcomers. Specific research questions are:

Demand

- What is the vision on the use of space in the Netherlands (this vision needs to address sustainable urbanization, the future of the agricultural sector, the role of landscapes and the place of subsurface functions (and ecosystem services) in relation to land)?

Land management

- Which (location) specific ecosystem services can be deployed to realize land use functions in an area and what are possibilities here of eco-engineering of building with nature?
- What does “optimal land use” look like?
- How can we give solid input to discussions around sustainable land use, looking across sectorial and disciplinary boundaries and with due consideration of possible futures?
- How to deal with land ownership in relation to our vision on sustainable land use?
- How can we optimise sustainable land use, (also) based on soil qualities on different spatial scales?

17.4 Experiences regarding connecting science to policy/practice

In the following sections are based on 16 interviews with National Key Stakeholders (NKS). They elaborate the experiences that the interviewed NKS have regarding science to policy and practice.

17.4.1 Use of scientific knowledge

'Scientific knowledge' can be defined in different ways:

"K*nowledge that contributes to understand "how things work", "Facts, numbers, statistics, process descriptions and experiences*"; "*Knowledge that is developed on scientific principles, and fundamentally or experimentally determined*"; "*Knowledge to solve problems*" or "*Factual knowledge*".

The difference between fundamental, strategic and applied research is broadly known and used in the Netherlands. The trend is that the focus of research shifts towards applied research, which can cause a gap on the side of fundamental research, which is expressed as a concern.

Many sources for scientific knowledge are used. Especially the more 'personal' ways to get knowledge are mentioned more frequent: own experience in research projects, colleagues, national and international experiences/examples. Knowledge "in people" is very valuable. Also more traditional ways for knowledge dissemination such as scientific articles and conferences, and reports and websites (www.soilpedia.nl, www.natuurlijkealliantie.nl, www.EUGRIS.org, EU portals, websites of research institutes) are mentioned.

It was stressed that knowledge exchange by reports is in some cases out-of-date. Serious gaming is mentioned as an alternative. We can learn here from universities that have knowledge transfer as core business.

Most NKS use (in higher or lower extent) scientific knowledge. They value knowledge to make well-founded choices in practical situation and for policy. Scientific knowledge is in the Netherlands certainly used for policy making. Co-creation between scientists and policy makers is mentioned as an effective method. However, in many cases the link between science and policy can be improved. As obstacles are mentioned:

- The value or credibility that is attributed to research
- Time span of programming. Urgent questions (short-term) get the research money
- "*Knowledge gives the policy maker what a lamppost gives the drunk: no light but support*"
- Difficulty to formulate the right questions. The dialogue between science and policy needs to be improved
- Research attitude is missing "*Policy makers search for answers and not for questions*"

17.4.2 Possibilities to set the agenda

The ability to influence research agendas differs per party. Many parties are involved or have the ability to join the conversation in the Netherlands. But as mentioned: "*To get something on an agenda is easier that to get something under the attention*." The latter is more important. A research program should be well designed, facilitating coherent, long term research. Linking research questions to societal challenges works well to get it on under the attention. For industries it is harder to set the research agenda, because they could be suspected to influence results.

The Dutch national policies/agendas reflect to a reasonable extent specific needs and priorities of different national parties. Sometimes it needs some time. Good examples and a good story work very well: "*show & tell*". However, there are more agendas than there is funding for research.

17.4.3 Science – policy – practice

Many of the NKS have been involved in doing scientific research, the formulation of scientific research questions and synthesizing/wrapping-up of scientific knowledge eg. for policy making. The lessons learned are:

- Practice When science needs to be used in practice, it is advisable to use the practical situation as a starting point, otherwise the scope of research will be too broad.
- Time Also it is important to have sufficient time. It needs investments in terms of time and effort to get knowledge to practice. The time scale between research (long term) and government (short term) is different and should be matched better.
- People The right people need to be involved: experts, visionaries, managers. People are the backbone of the knowledge field. The role of researchers and policy makers in the science-policy interface can be improved. The researchers also need to translate the results of the research to an interpretation that is valuable for policy. They can also help formulating the right question. Policymakers must look beyond the answers they need to do their job. They should adopt a helicopter view, looking over the boundaries of their field and to the problems and challenges behind the "now and here" questions. This enables them to ask the right questions to research.
- Trust To get research in practice, all parties must trust the outcomes of the research

Apart from the above discussion, many NKS emphasize the attention for fundamental research. In the Netherlands the trend is to focus on more short term results, applied research for direct questions. "*There are two knowledge cycles. One to go from nothing to something and one to go from something to something better*." The first cycle gets not enough attention. This has as a result that no new knowledge will be developed.

The Science-Policy-Interface documents that were recommended are listed in annex II.

17.5 National and transnational funding schemes

17.5.1 Funding schemes and possibilities for research funding

	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
Regional				
1	new collaborations /co-creation	public and / or private parties	Many parties have some budget and the same questions. Join forces.	N/A
2	Networks / COPs / living labs	They more facilitate parties to work together (and pile different financial inputs of different parties) than that they have own money to fund research Examples 1* SBRCURnet (on built environment) 2* Platform31 (on cities and regions, spatial planning) 3* Railforum (on knowledge for rail infrastructure) 4* Nudge (on sustainability)	case specific / depending on topic / parties involved	1* http://www.sbrcurnet.nl/ 2* http://www.platform31.nl/ 3* http://www.railforum.nl/ 4* https://www.nudge.nl/
3	research collaboration within regions	They more facilitate parties to work together (and pile different financial inputs of different parties) than that they have own money to fund research Examples: 1* AMS - Advanced Metropolitan Solutions 2* Knowledge centre Healthy Urban Living 3* USI - Utrecht Sustainability Institute	case specific / depending on topic / parties involved	1* http://www.ams-amsterdam.com/ 2* http://www.kchul.nl/ 3* http://www.usi.nl/

4	Public-private collaboration such as:	public-private collaborations	case specific / depending on topic / parties involved	eg: https://www.government.nl/topics/public-private-partnership-ppp-in-central-government
	Citydeals	public-private collaborations between cities and urban regions (also across borders)	case specific / depending on topic / parties involved	http://agendastad.nl/
	Greendeals	public-private collaborations between business and industry, governments, research partners and societal initiatives	case specific / depending on topic / parties involved	https://www.rijksoverheid.nl/onderwerpen/duurzame-economie/inhoud/green-deal
	Name*	**Research and Innovation funder****	**What and/or whom do they fund?*****	**More info********
5	Social / sustainability funds / pension funds	These funds are interested in investments that give long term revenues. Examples: 1* ABN Amro Social Impact Fund	case specific / depending on topic / parties involved	1* https://verdermetfinancieren.abnamro.nl/soorten-financiering/abn-amro-social-impact-fonds-investeert-in-sociale-ondernemingen/
6	Crowdfunding	"the crowd": companies, citizens,	Initiator of the (research) project. Crowdfunding is difficult for research projects (easier for development of products). A very clear research question /objective and contact with the crowd is needed	examples on http://www.crowdfunding.nl/
7	Revolving funds	different funds. Examples are: 1* Housing corporations	Labelled money. The investment should give revenues. The difference with an investment fund is that it should serve a public goal.	
8	Project based research	public and / or private parties	Ad hoc/ made-to-measure research	N/A
9	research / innovation budget Industries / large companies	Most industries have own research funding /innovation budgets	case specific / depending on topic	N/A
10	research / innovation budget Decentral authorities	Many decentral authorities have their own innovation / research budgets	case specific / depending on topic	N/A

National				
1	HABIFORUM / BASIC		program for front runner research on spatial planning, area development (1999-2009, program closed). Given as example for financing constructions.	http://kennisbank.platform31.nl/pages/27127/Habiforum.html
2	B-Basic BioBAsed Sustainable Industrial Chemistry	financed with public (natural gas benefits) and other parties (universities and research institutes	program for front runner research on biotechnology (program closed). Given as example for financing constructions.	http://www.tudelft.nl/nl/actueel/laatste-nieuws/artikel/detail/groen-licht-voor-miljoenenonderzoek-industriele-biotechnologie/
3	SKB (Stichting Kennisontwikkeling Kennisoverdracht Bodem) (formerly known as NOBIS (Nederlands Onderzoeksprogramma Biotechnologische In-Situ saneringen))	partly funded by SKB (public money) and for each project cofinancing was needed (=/- 50%)	program for research on soil (1995-12014, program closed), with open tenders, first on remediation, later on broader soil themes (planning, energy, groundwater, agriculture). given as example for financing constructions. this program does not exist anymore.	http://skbodem.nl/
4	KIBO knowledge and innovation program soil and subsurface	public money (ministry of Infrastructure and the environment) and for each project cofinancing is needed (=/- 75%)	open continuous call for businesscases with public and private parties and research parties, on topics that are in the Dutch research agenda for the subsurface	https://www.rijksoverheid.nl/onderwerpen/bodem-en-ondergrond/inhoud/ruimtelijke-ordening-ondergrond
5	Money related to national tasks and dossiers	The ministries have their own innovation / research budgets related to dossiers Such as Soil Protection Act: Wbb transition money, RWS Corporate Innovation Program, Policy supporting research (BOA)	case specific / depending on topic	
6	STOWA (Foundation for Applied Water Research)	Collaboration between water authorities	demand-driven water research. Space for innovative ideas. Open for different parties: case specific / depending on topic	http://stowa.nl/english/

7	Fundamental research of universities	Most of this research is financed by society (public money)	Universities. Back bone for knowledge development: needed to maintain knowledge base	
8	3rd flow of funds (universities)	public, private, with industries and governments	project oriented research for universities: budgets can be substantial	
9	NWO - Nederlandse Organisatie voor Wetenschappelijk Onderzoek (Dutch Organisation for Scientific Research)	NWO finances research projects on universities and research institutes	different subjects and different financing instruments. Eg: universities can finance PhDs en postdocs with NWO	http://www.nwo.nl/
10	Applied research of research institutes	Most of this research is financed by society (public money)	Research institutes Back bone for knowledge development: needed to maintain knowledge base	
11	Topsectors	ministry of economic affairs	Financing of research in "businesscases" to strengthen the Dutch research sectors by excellent research. Government, industry, universities and research institutes work together here on research and innovation (relevant topsectors: Agri&Food, Water and Energy, chemistry, horticulture, Life science and health). The topsectors set the research agendas.	http://topsectoren.nl/ http://topsectoren.nl/documenten/topsectoren/Topsectors-in-the-Netherlands_English_2015-10-27_267.pdf
	TKI - top consortia for knowledge and innovation (under topsector)	ministry of economic affairs	The TKIs are implementing the research agendas of the topsectors in public private collaboration between research organisations and business community	http://www.rvo.nl/subsidies-regelingen/tki-toeslag

	Name*	Research and Innovation funder**	What and/or whom do they fund?***	More info****
12	NKWK - nieuw kennisprogramma water- en klimaatinnovatie (new knowledge program for water and climate innovation)	RWS, business and research organisations	public private collaboration between research organisations, business community and authorities	http://www.rijkswaterstaat.nl/over-ons/nieuws/nieuwsarchief/p2015/05/NKWK-nieuw-kennisprogramma-water-en-klimaatinnovat.aspx http://www.nkwkstartconferentie.nl/
13	Partners for International Business (PIB)	Ministry of economic affairs	Aimed on Dutch parties to work with partners abroad. Funding aimed at: Promotion and matchmaking Knowledge exchange and networks Economic diplomacy	http://www.rvo.nl/subsidies-regelingen/partners-international-business-pib
European				
1	Horizon 2020 (and before EU Framework Programmes).	EU and private investments	EU Research and Innovation programme (2014 to 2020). Open for consortia, with different parties on different topics (eg societal challenges)	https://ec.europa.eu/programmes/horizon2020/
2	JPI - Joint Programming Initiatives	Member States commit to Joint Programming Initiatives (JPIs)	open for consortia of the contributing member states	http://ec.europa.eu/research/era/joint-programming_en.html
3	Interreg	financed by the European Regional Development Fund	helps regions of Europe share knowledge and transfer experience to improve regional policy	http://www.interreg4c.eu/
4	ERANET - European Research Area Network	instrument under Horizon 2020	instrument to support public-public partnerships in their preparation, establishment of networking structures, design, implementation and coordination of joint activities as well as topping up of single joint calls and of actions of a transnational nature	http://ec.europa.eu/research/era/era-net-in-horizon-2020_en.html
5	LIFE +	instrument under Horizon 2021	EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU	http://ec.europa.eu/environment/life/

6	SNOWMAN	SNOWMAN is a transnational group of research funding organizations and administrations in the field of soil sustainable management in Europe.	calls, open for parties of participating countries	http://snowmannetwork.com/
7	European structural funds	EU	Structural Funds play a substantial role to help all regions build research and innovation capacities corresponding to their situation and priorities.	http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=structural_funds
8	Revolving funds	different funds. Examples: 1* some european structural funds, eg JESSICA (Joint European Support for Sustainable Investment in City Areas)	Labelled money. The investment should give revenues. The difference with an investment fund is that it should serve a public goal.	1* http://ec.europa.eu/regional_policy/index.cfm/en/funding/special-support-instruments/jessica/
9	European subsidies	Eu	Eg. for agricultural sector, European rural development programs	
10	Wetsus, European centre of excellence for sustainable water technology	Wetsus is part of WaterCampus Leeuwarden. Wetsus is a facilitating intermediary and creates an environment and strategic cooperation for development of profitable and sustainable state of the art water treatment technology.	Infrastructure / research facilities are provided. Companies and research institutes from all over Europe that want to innovate join. Also the city and region participate (stimulating economic development of the region)	https://www.wetsus.nl/home/what-is-wetsus
International				
1	European Bank for Reconstruction and Development EBRD			http://www.ebrd.com/
2	Worldbank / Asian development bank etc.		Projects restricted to developing countries, although research organisations worldwide can participate	http://www.worldbank.org/ http://www.adb.org/
3	Rockefeller foundation			https://www.rockefellerfoundation.org

Overall comments:

The gap between fundamental and applied research was mentioned many times. There is more money now available for applied research. The sectorial character of the top sectors is also reason for concern. For some more integrated research it is difficult to get funding.

There is a lot of attention for business cases in the Netherlands. This can be very difficult money and there should remain attention for flexibility, innovation, seed money for good ideas. A lot of attention exists for involvement of small and medium sized enterprises (SMEs), because a lot of money goes on within SMEs: in total. Per organisation the amount is limited. Therefore, the flexibility for them to join a research initiative is also limited. They focus on continuity of their business and money spend should serve a direct goal.

17.5.2 Gaps in financial resources for research

The gaps as indicated in this section are resulting from 16 interviews with National Key stakeholders.

Topics that are not or insufficiently covered within research programs and funding possibilities, are obviously the aspects that are not directly linked to tasks or core business of organisations. If there is no direct ownership, topics are imminent to remain unaddressed, even though these “cross-border” subjects can give us interesting insights and impulses for innovations. We have to “brand” these aspects in a better way to get financing. Shrinking cities and soil subsidence are examples that were left alone for a long time in the Netherlands, but are now on the agenda after much effort. Aspects that need more attention:

- Land use and monitoring
- Landscapes
- Rural development
- Illnesses related to agriculture: e.g. Q fever
- Nature policy and legislation
- How to deal with invasive species.
- Integrated approach eg. needed for eco-Engineering projects
- Landfills in rural areas eg. possibilities for landfill mining / Biomass
- Soils and subsurface
- Radioactive waste (on a European level)
- Revision standards for soil classes
- Emerging contaminants
- Hormones in (drinking) water
- Trans-border issues

Programming and financing of research and policy are in the Netherlands (and also in the EU) still quite sectorial. This obstructs integrated research and approaches. For integrated research, collaboration should be sought. This takes a lot of effort. Ingredients are:

- Involve other fields of expertise
- Search for synergies
- Find ways to spend earmarked money to a broader project
- Make a good analysis in terms of people, planet and profit to communicate the benefits and needs of the research
- Show overall value
- Show who invests and who gets the benefits.

17.6 Other remarks made by NKS

Messages for the INSPIRATION consortium:

- Pay attention to the presentation and communication of the SRA. Pitches and stories work better than a 100 page report (multimedia presentation of the agenda?)
- Show paradoxes (food supply by up-scaled industrial agricultural verses the trend of more biological and local agriculture)
- Agendas can be demand / solution driven, but also inspirational and creative
- Incite the public with the SRA and relate the questions to possibilities for the stakeholders to take action
- Research strategies should be based on a shared vision of a future to be striven for. Such vision cannot be static but should at least allow to define pathways and no-regret measures to achieve the vision
- Pay attention to practical solutions and examples
- It is good to spend attention to innovation. We cannot steer innovation but pay attention to creation of a positive climate for innovation
- Pay attention to the position of women in science. In the Netherlands only 17% of the professors is female
- Make sure the NKS remain involved during the project. A platform where stakeholders can meet on a regular basis and reassess progress and objectives (a lot can change until the end of the INSPIRATION project)
- How can we show our strengths (research, knowledge, practice) on a national basis? Match strengths of countries to questions in other countries

17.7 Annexes

Annex I: NKS interviews and reviews in the Netherlands

Date of interview	Organisation	Interview	Reviewed:	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ. research	SME /consultant	business industry	NGO	Net-work	other	soil	sedim.	water	land use-mngmnt
17-06-15	ProRail	Jeroen ter Meer & Paul van der Voort	Ch 17.3.2: NL-6	1	1					1				1			1
30-07-15	KIBO	David vd Burg	Ch 17.3.1	1			1							1			
30-07-15	IenM	Ruud Cino		1	1		1							1			
04-08-15	Nudge	Tieneke Breemhaar				1			1							1	1
06-08-15	SBR-CURnet	Geert-Jan Verkade	Ch 17.3.2: NL-5	1	1							1		1	1	1	1
06-08-15	Platform31	Jeroen Niemans	Ch 17.3.1		1	1						1					1
13-08-15	Bouw-campus	Han de Wit	Ch 17.3.2, ch 17.4		1	1		1		1		1		1			1
13-08-15	Waternet	Fred de Haan		1	1		1								1	1	
20-08-15	TCB /IenM	Joke van Wensem	Ch 17.3.2: NL-11, NL-12, NL-13	1		1	1							1			
26-08-15	RUG	Rien Herber	Ch 17.3.2: NL-8,			1		1						1			1

			NL-10														
27-08-15	SEDNET / RWS	Pieter de Boer		1	1	1	1					1			1		
31-08-15	VITENS	Johan Driessen	Ch 17.3.2: NL-3, NL-4		1					1						1	
01-09-15	TUD	Fransje Hooimeijer	Ch 17.3.2: NL-5			1		1									1
02-09-15	Nicole / TAUW	Laurent Bakker	Ch 17.3.2: NL7, NL14			1			1					1		1	
09-09-15	WUR	Bas Pedroli	Ch 17.3.2: NL2,NL-15			1		1						1			1

Date of interview	Organisation	Interview	Reviewed:	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ. research	SME /consultant	business industry	NGO	network	other	soil	sedim.	water	land use-mngmnt
15-09-15	Prov Brabant	Jaap Harthoorn	Ch 17.3.2: NL-1, NL-2, NL-3, NL-7	1	1		1							1	1	1	1
11-12-15	Gem. Utrecht	Henk vd Berg		1	1		1							1			1
18-01-16	STOWA	Michelle Talsma	Ch 17.3.2: NL-3, NL-4	1	1		1									1	
28-01-16	IenM	Jan van Schoonhoven		1	1		1										
N/A	Nicole	Paul van Riet	Ch 17.3.2: NL-7	1	1	1				1		1		1			1
N/A	ZLTO	Harry Kager	Ch 17.3.2: NL-1,NL-2	1	1							1	1	1		1	1
N/A	PBL	Maria Witmer	Ch 17.3.2: NL-1,NL-2			1	1							1	1	1	1
N/A	Gemeente Nijmegen	Henk Jan Nijland	Ch 17.3.2: NL-5, NL-6, NL-7	1	1		1							1		1	1

N/A	RIVM	Ton Breure	Ch 17.3.2: NL-8, NL-9			1		1						1		1	
N/A	Provincie Zeeland	Walter Jonkers	Ch 17.3.2: NL-3, NL-4	1	1		1							1		1	1
N/A	Provincie Zuid-Holland	Leo Hamerlinck	Ch 17.3.2: NL-8, NL-9	1	1		1							1			

Annex II: Documents used for the desk study

Documents underpinning societal challenges and related research questions:

Bedrijfstakonderzoek: Gezamenlijke kennisagenda (5 jarenplan) van de drinkwaterbedrijven http://www.kwrwater.nl/BTO/

Bouwcampus 2015 Themakaart bouw (concept 2). Bouwcampus, Argumentenfabriek

CATO programma (CO2 opslag) http://www.co2-cato.nl/

Collegeakkoord provincie Noord-Brabant https://www.brabant.nl/

Dynamische Uitvoeringsagenda (DUA) Brabant van het PMWP, en het bijbehorende uitvoeringsprogramma Vitale Bodem (not published yet)

EDGAR gasprogramma (beta gamma over toekomst gas in NL. biogas tot gasrotonde en CCS) http://www.edgar-program.com/nl/nieuws/enabling-sustainability-with-gas

Energieprogramma wat in november wordt geissued door kabinet (not available yet)

EU COM Land as a resource http://ec.europa.eu/environment/land_use/index_en.htm

Hajer en Dassen, 2015. 'Slimme steden - de opgave voor de 21e-eeuwse stedenbouw in beeld' PBL

Jeuken Ad, Lieselotte Tolk, Lodewijk Stuyt, Joost Delsman, Perry de Louw, Esther van Baaren, Marcel Paalman. (2015) zelfvoorzienend in zoetwater: zoek de mogelijkheden. STOWA rapport 30, Amersfoort NL

Kennisagenda Bodem en Ondergrond (2011)

Kennisagenda geothermie Kennisprogramma ondergrond EZ not published yet (http://www.namplatform.nl/investeren-in-de-regio/educatie/ontwikkeling-kennisprogramma).

Klijn Frans, Maarse Maaike (2015) Wat te doen tegen de toename van overstromingsrisico's inde toekomst? STOWA rapport 33, Amersfoort NL

Kuiper Rienk. (2015) Verkenning omgevingsopgaven voor de Nationale Omgevingsvisie PBL rapport 2268 http://www.pbl.nl/publicaties/verkenning-omgevingsopgaven-voor-de-nationale-omgevingsvisie

Mesters Carleen, Pötz Hiltrud (undated) KAS. de Klimaatactieve Stad. Hoe lokale initiatieven te omarmen, te stimuleren en de samenwerking in de stad te bevorderen. STOWA, Unie van Waterschappen, Ministerie van IenM

NICOLE: document voor NICOLE. (not published, on demand) http://www.nicole.org/

Ovv rapport rond bevingen http://www.onderzoeksraad.nl/uploads/phase-docs/843/33ef77ab629erapport-gaswinning-groningen-nl-interactief.pdf

PBL Toekomst van de landbouw ex ante evaluatie

Platform31 (2015) Maak Ruimte. Manifest ikv Jaar van de Ruimte. https://wijmakennederland.nl/pdf/Manifest2040.pdf

Prorail Innovatie en ontwikkelagenda 2015 (not public).

Prorail (2013) Meerjarenplan Duurzaamheid 2013-2015

Provinciaal Milieu- en Waterplan 2016-2021 (strategisch document) en bijbehorend uitvoeringsplan (in de maak) http://www.brabant.nl/dossiers/dossiers-op-thema/water/waterbeleid/provinciaal-milieu-en-waterplan-2016-2021.aspx

Raad voor de Leefomgeving en infrastructuur (2013) Ruimte voor duurzame landbouw Publicatie RLI 2013/01 http://www.rli.nl/sites/default/files/rli008-1dowwtkbinnenwerkb5170x235metcoverinteractief_0.pdf

Raad voor de Leefomgeving en infrastructuur (2015) VERNIEUWING OMGEVINGSRECHT: MAAK DE AMBITIES WAAR. Publicatie Rli 2015/07 http://www.rli.nl/publicaties/2015/advies/vernieuwing-omgevingsrecht-maak-de-ambities-waar. Publicatie Rli 2015/07

SMART URBAN REGIONS OF THE FUTURE http://surf.verdus.nl/voorpagina

STOWA (2015) goede grond – goed voor landbouw natuur én waterbeheer STOWA brochure 19a, Amersfoort, NL

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Annex IIIa: National workshop attendees

The first day a large group of attendees were invited. The second day was specifically for the NKS.

NKS:

Organisation	Name	Funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	Topic 12 November	Topic 13 November
Waternet	Fred de Haan*	1	1		1								Resources and Energy
Bouwcampus (TAUW)	Han de Wit*		1	1		1		1		1		Water and Climate	Water and Climate
ZLTO	Harry Kager*	1	1						1				Rural area
Gemeente Nijmegen	Henk-Jan Nijland*	1	1		1							Urban area	Urban area
Provincie Noord-Brabant	Jaap Harthoorn*	1	1		1							Rural area	Rural area
SBNS	Jan Fokkens*	1	1					1				Resources and Energy	
VITENS	Johan Driessen*	1	1					1				Water and Climate	
Nicole (TAUW)	Laurent Bakker*			1			1			1		Urban area	Urban area
RWS	Pieter de Boer*	1	1		1							Resources and Energy	
WUR	Saskia Keesstra*			1		1						Water and Climate	
RIVM	Ton Breure*			1		1						Water and Climate	Resources and Energy
Provincie Zeeland	Walter Jonkers*	1	1		1							Rural area	Water and Climate
PBL	Maria Witmer#			1		1						Rural area	Rural area

*National Key Stakeholder INSPIRATION

Advisory board INSPIRATION

Attendees 12 November

Organisation	Name	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ res. inst	SME / consultant	business & industry	NGO	network	other	Topic 12 november	Topic 13november
Gemeente Rotterdam	Anton Roeloffzen	1	1		1							Urban area	
ZLTO	Arno Peekel	1	1						1			Rural area	
IenM	Auke Oostra	1	1		1							Urban area	
gemeente Rotterdam / bodembreedforum	Cees Buijs	1	1	1	1			1				Urban area	
RWS	Co Molenaar	1	1		1							Water and Climate	
Witteveen+Bos	Corinne Koot			1			1					Resources and Energy	
IenM	Dick Brand	1	1		1							Resources and Energy	
Grontmij	Dirk Jan Pasma			1			1					Resources and Energy	
RWS	Gerd de Kruif	1	1		1							Resources and Energy	
LandschappenNL	Gerrit-Jan van Herwaarden	1	1						1			Rural area	
RWS	Jan Frank Mars	1	1		1							Urban area	
WUR	Janjo de Haan			1		1						Rural area	
TNO	Jasper Griffioen			1		1						Resources and Energy	
WUR	Joop Okx			1		1						Rural area	
Grontmij	Karen Huijsmans			1			1					Rural area	
provincie Zuid-Holland	Leo Hamerlinck	1	1		1							Resources and Energy	
ImpactReporters	Marianne Heselmans		1				1					Rural area	
Bioclear	Marlea Wagelmans			1			1					Rural area	
RIVM	Michiel Rutgers			1		1						Urban area	
WUR	Peter Kuikman			1		1						Water and Climate	

Organisation	Name	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ res. inst	SME / consultant	business & industry	NGO	network	other	Topic 12 november	Topic 13november
MWH	Peter van Mullekom			1			1					Resources and Energy	
RIVM	Piet Otte			1		1						Water and Climate	
Zonnehoeve	Piet van Ijzerdoorn		1				1					Rural area	
PBL	Ron Franken			1		1						Water and Climate	
Deltares	Sophie Vermooten			1		1						Resources and Energy	
Grond RR Adviesbureau	Vincent Grond			1			1					Urban area	

Organisers workshop

Organi-sation	Name	Role	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	other	Topic 12 November	Topic 13 November
Deltares	Linda Maring	Table leader			1		1						Urban area	Urban area
RWS	Geraldien Kok	reporter	1	1		1							Urban area	
RWS	Margot de Cleen*	Table leader	1	1		1							Water and Climate	Water and Climate
TAUW	Mark in 't Veld	reporter			1			1					Water and Climate	
RIVM	Sandra Boekholt	Table leader			1		1						Rural area	Rural area
RHDHV	Dorien Derks	reporter			1			1					Rural area	
Deltares	Jos Brils	Table leader			1		1						Resources and Energy	Resources and Energy
Deltares	Sophie Moinier	reporter			1		1						Resources and Energy	
Deltares	Corrie Lammers	Secretariat												

*National Key Stakeholder INSPIRATION

Annex IIIb: National workshop programme

Programme 12 november

Time	Activity	speaker
12:30	Entrance with coffee / tea	
13.00	Welcom, objectives of the day and programme	Linda Maring
13.10	INSPIRATION	Jos Brils
13.30	State of the art for: • Dutch knowledge agenda • INSPIRATION	Margot de Cleen & Linda Maring
14.00	Elaborating topics (4 groups) • Urban area • Rural area • Water and Climate • Resources and Energy	Urban area: Linda Maring Reporting: Geraldien Kok Rural area: Sandra Boekhold Reporting: Dorien Derks Water and Climate: Margot de Cleen Reporting: Mark in ‘t Veld Resources and Energy: Jos Brils Reporting: Sophie Moinier
15.00	coffee / tea break	
15:15	Elaborating topics (4 groups) prioritize / actions	
15.45	Results and additions (Plenary)	Table leaders / reporters
16.50	Follow-up and en closure day 1	Linda Maring, Jos Brils
17.00	Drinks	

Programma 13 november

Time	Activity	speaker
09.00	Welcome back for NKS, objectives of the day and programme	Linda Maring
09.10	Looking back at results day 1 ->elaborated example: Resources and Energy: How can we use the ecosystem in a sustainable way?	Urban area: Linda Maring Rural area: Sandra Boekhold Water and Climate: Margot de Cleen Resources and Energy: Jos Brils
09.30	Elaboration of topics in small groups	
10.15	coffee / tea break	
11.15	Results per table	
12:15	Next steps INSPIRATION	Linda Maring
12.30	Closure national workshop with lunch	

The full minutes of the workshop can be found on http://www.inspiration-h2020.eu/sites/default/files/upload/verslag12-13nov_kennisagenda_inspiration_071215.pdf

Annex IV: Research questions (in Dutch)

Agriculture and food / Landbouw en voedsel

bewustwording	1 bewustwording Hoe maken we stakeholders bewust van het belang van een goede bodemkwaliteit voor voedselveiligheid en -kwaliteit en hun rol hierin? DEMAND 2 bewustwording Wat kunnen we in Nederland doen om te komen tot herstel van bodemkwaliteit, duurzamer bodemgebruik hier en elders en daarmee bij te dragen aan de VN-Sustainable Development Goals? DEMAND bewustwording Wat zijn de trends in diëten en wat betekenen die voor bodem en watergebruik, gezondheid, hoe krijg je mensen zo ver dat ze minder dierlijk eiwit gaan eten? DEMAND bewustwording Wie zijn winnaars en verliezers in de voedselketen van een transitie naar gezondere (voor mens en milieu) diëten en duurzame landbouw en hoe vang je de verliezers op? Wat zou de rol kunnen zijn van het GLB voor deze transitie? DEMAND bewustwording Hoe kunnen we komen tot een implementatie van de Nitraatrichtlijn en de Kaderrichtlijn Water in Nederland die agrarische ondernemers uitdaagt om op een goede manier met de bodem om te gaan? LANDMAN
Statusbepaling	3 Statusbepaling Wat is een gezonde bodem? Meer specifiek: Wat is de staat van de bodem (bodemleven, bodemstructuur, kwaliteit, gehalte en de kwaliteit van bodemorganische stof etc., geïntegreerd fysisch-chemisch-biologisch) in relatie tot de landbouwfunctie en andere ecosysteemfuncties (waterberging, ziektewering, bodemvruchtbaarheid, producerend vermogen, etc.)? NATCAP
Systeemkennis	4 systeemkennis Hoe kan het natuurlijk bodem-watersysteem optimaal worden benut voor de verduurzaming van de landbouw? LANDMAN 5 systeemkennis Welke systeemkennis is nodig om van de landbouw een resource efficiënt sector te maken? Dit geldt zowel regionaal als mondiaal en heeft een relatie met het sluiten van kringlopen en de footprint van de landbouwproducten. LANDMAN 6 systeemkennis Hoe kunnen natuurlijke processen worden benut om gedegradeerde bodems te herstellen en gezonde bodems (Zie vraag 3 Statusbepaling) te behouden. NATCAP/ LANDMAN systeemkennis Wat is het effect van een goede bodemkwaliteit op de emissies van stikstof en fosfaat vanuit de land- en tuinbouw? NATCAP
afwegen	7 afwegen Welke factoren bepalen of de geschiktheid van de bodem voor landbouw in ruimtelijke en economische keuzes wordt meegenomen en welke optimalisaties zijn hierin mogelijk? LANDMAN 8 afwegen Hoe kunnen we de bodem en bodembiodiversiteit als natuurlijk kapitaal voor de landbouw waarderen en vertalen naar verdienmodellen? LANDMAN afwegen Kunnen we met kennis van het bodemecosysteem landbouw verweven met andere functies zoals waterbeheer, natuurbeheer, energieopwekking, klimaatadaptatie en - mitigatie? LANDMAN

implementatie	9 implementatie Hoe zijn boeren te stimuleren om (nieuwe of verbeterde) landbouwmethoden zodanig in te zetten dat ze lage productiviteit voorkomen, leiden tot bodemherstel en een verminderde afhankelijkheid van externe grondstoffen? LANDMAN - Hoe nutriëntenkringlopen vormgeven c.q. sluiten? - Hoe kunnen we biotische reststromen in productieketens duurzaam benutten in de landbouw om te komen tot een circulaire economie, leidend tot verbetering van de bodemkwaliteit? - Hoe komen we tot effectief beheer van organisch stof in de bodem? - Wat kan precisielandbouw bijdragen aan bodembewuster boeren? - Hoe kunnen traditionele landbouwpraktijken zoals gewasrotatie en wisselteelt worden gecombineerd met moderne kennis op het gebied van landbouw? 10 implementatie Hoe gaan we om met / voorkomen we bedreigingen als verdichting, microbiële risico's door ziekteverwekkers in de bodem, antimicrobiële resistentie, bodemdaling en verzilting? LANDMAN 11 implementatie Wat betekenen trends en ontwikkelingen in de landbouwsector zoals schaalvergroting, korte-termijn-verdienmodellen, landbouw afgestemd op de marktvraag in plaats van volgend aan de mogelijkheden van het systeem, voor bodem en ondergrond (kansen en bedreigingen voor benutting van het bodem-watersysteem)? DEMAND 12 implementatie Hoe kunnen we bestaande kennis van bodembiodiversiteit vertalen naar praktisch handelingsperspectief voor boeren? LANDMAN
Evaluatie	13 evaluatie De mondiaal veranderende levensstandaard (meer, of juist minder consumptie van zuivel en vlees, hogere energiebehoefte, wel of geen biologisch voedsel) heeft effecten op de landbouwpraktijk. Wat betekent dit voor het bodemgebruik in Nederland en de (landgebruik, water, nutriënten) footprints elders? Wat zijn de risico's op bodemdegradatie? Is beleidssturing gewenst en hoe is deze in te vullen? IMPACT 14 evaluatie Wat zijn effecten van diverse landbouwmethoden op verduurzaming van de landbouw en verbetering van de bodemkwaliteit? IMPACT Evaluatie Kunnen we inzichtelijk maken wat op de korte en lange termijn de invloed is van bewust omgaan met de bodemvruchtbaarheid? IMPACT Evaluatie Wat zijn de gevolgen van landbouwpraktijken voor eutrofiëring kustzones, grondwaterkwantiteit en kwaliteit, klimaat wereldwijd? IMPACT

Liveability of rural areas / Leefbaarheid landelijk gebied

bewustwording	1 bewustwording Is het van belang voor de leefbaarheid van het landelijk gebied (identiteit) om de betekenis van bodem en ondergrond te laten zien als basis van kenmerkende landschappen (inclusief aardkundige waarden, archeologie, geomorfologie)? En zo ja: hoe brengen we de 'leesbaarheid' van de ondergrondkarakteristieken in het landschap terug? NATCAP 2 bewustwording Hoe kunnen we de leefbaarheid van het landelijk gebied verbeteren door optimaal gebruik te maken van het bodem-sediment-water systeem en landbeheer, waarbij natuurlijke en culturele waarden en economische en sociale vestigingsfactoren worden meegenomen? DEMAND 3 bewustwording Hoe kunnen aardkundige, culturele en biologische waarden boven en onder maaiveld worden uitgedrukt in sociale en economische waarden? NATCAP
statusbepaling	4 statusbepaling Kunnen economische / sociaal-culturele scenario's worden ontwikkeld die verschillende vormen van landgebruik combineren tot een attractief en leefbaar landelijk gebied? Hoe kan een dergelijk multifunctioneel ruimtegebruik economie en ecologie versterken? LANDMAN 5 statusbepaling Hoe kunnen we het Programma Aanpak Stikstof (PAS) benutten om het landgebruik en daarmee de leefbaarheid van het landelijk gebied te bevorderen? LANDMAN statusbepaling Welke kansen kan de vraag naar regionale biomassa voor biomassaketels bieden om aanleg en onderhoud van landschapselementen te stimuleren? DEMAND
Systeemkennis	6 Systeemkennis Wat is de rol van bodem bij gezondheid? LANDMAN - Wat is de rol van de bodem, waterbodem, water bij de verspreiding van infectieziekten die van dieren op mensen (of andere dieren) overgaan (zoönosen zoals Q-koorts)? - Wat is de rol van de bodem, waterbodem, water bij de verspreiding van antibiotische resistentie? - Wat is de rol van de bodem bij de verspreiding en risico's van (nieuwe) verontreinigingen zoals geneesmiddelen en nanodeeltjes? - Wat is de samenhang hiervan met landgebruik en veiligheid in het landelijk gebied? Hoe kunnen deze risico's door bodembeheer samenhangend met landbouwmethoden worden verkleind? 7 Systeemkennis In welke mate betekent de ontwikkeling in peri-urbane gebieden naar zorgboerderijen, kinderdagverblijven, recreatie bij de boer en daardoor potentiële blootstelling aan diverse stoffen, een mogelijke toe- of afname van de volksgezondheid? LANDMAN/IMPACT

Afwegen	8 afwegen Hoe kunnen we landbouw en andere gebruiksvormen zoals natuur vormgeven zodat het soil-sediment-water systeem wordt versterkt in het landelijk gebied en duurzame landbouw als functie mogelijk blijft? LANDMAN afwegen Welke kennis en maatregelen zijn er om, daar waar transitie van landbouwgebieden naar natuur aan de orde is, dit plaats te laten vinden zonder ingrijpende maatregelen zoals afgraven (transitie naar juiste nutriëntengehalte, waterkwantiteit)?LANDMAN afwegen Hoe kan de landbouw gestimuleerd worden om de bijdrage aan de (bodem)biodiversiteit en de natuur te vergroten? LANDMAN 9 afwegen Hoe kunnen we ambities voor bodem en ondergrond in het landelijk gebied in de Omgevingswet en afgeleide instrumenten (o.a. omgevingsvisie) een positie geven? Welke kennis van het bodem-sediment-watersysteem is hiervoor van belang? LANDMAN 10 afwegen Welke factoren beïnvloeden beslissingen over landgebruik in het landelijk gebied en hoe het bodem-sediment-water systeem worden betrokken bij ruimtelijke planvorming en landinrichting? LANDMAN
Implementatie	11 Implementatie Wat draagt het bodem-sediment-water systeem bij aan ruimtelijke kwaliteit in gebiedsontwikkelingen zoals Ruimte voor de Rivier? LANDMAN 12 Implementatie Hoe betrekken we de gebruikers van land en grondwater in een gebied bij het realiseren van schoon grondwater en een gezonde bodem voor landbouw en natuur? LANDMAN 13 implementatie Hoe kunnen huidige instrumenten beter worden gehandhaafd en/of zijn nieuwe instrumenten nodig om de leefbaarheid van het landelijk gebied te behouden en bevorderen op basis van de kenmerken van het lokale natuurlijk systeem en sociaal-culturele eigenschappen, gericht op functiecombinaties? LANDMAN
Evaluatie	14 evaluatie Welke landbeheermaatregelen zijn effectief bij het verhogen van de leefbaarheid van landelijk gebied en het realiseren van duurzame natuur (evalueren adhv pilots, uitwisseling kennis, ervaringen in “agrocommunities”)? IMPACT evaluatie Wat zijn de werkelijke kosten en baten van landgebruik in landelijk gebied, wie verdienen, wie dragen de kosten, en hoe wordt dit eerlijker verdeeld? LANDMAN

Climate change / Klimaatadaptatie en -mitigatie

Bewustwording	1 Bewustwording Welke kansen voor allianties zijn er om de opgaven voor klimaat vanuit de potentie van het bodem-watersysteem op te pakken met andere maatschappelijke opgaven (zoals energie en de slimme stad)? DEMAND/INLEIDING 2 Bewustwording Welke rol speelt het landgebruik en het beheer van het bodem- en watersysteem in de opgaven voor klimaat en wordt de potentie van deze rol ten volle gekend? LANDMAN 3 Bewustwording Is, voor de bodemsector, organisch stof het referentiepunt voor de klimaatopgave? NATCAP
Statusbepaling	4 Statusbepaling Wat is het effect van klimaatverandering op IMPACT • bodemkwaliteit, bodemeigenschappen, bodembiodiversiteit, bodemprocessen, bodemdaling en ecosysteemdiensten? • het gebruik van de ondergrond, land en leefomgeving? • invasieve bodemgebonden pathogenen? • Plagen door ontbreken vorstperiode, waardoor nieuwe bestrijdingsmiddelen nodig zijn?
Systeemkennis	5 Systeemkennis Hoe monitoren we de verschillende effecten van klimaatverandering op het natuurlijk systeem (natuurlijk kapitaal, gezondheid, ecosysteem)? IMPACT 6 Systeemkennis Welke potentie heeft de ondergrond voor klimaatadaptatie en-mitigatie (optimalisatie van landgebruik ter vermindering van de uitstoot van broeikasgassen, verhoging organisch stof gehalte, vermindering verlies organisch stof, verhoging watervasthoudend vermogen, waterveiligheid, stabiliteit van grondlichamen et cetera.) ? NATCAP
Afwegen	7 Afwegen Hoe kunnen wij het gebruik (adaptatie) van het bodem-watersysteem aanpassen aan de effecten van klimaatverandering LANDMAN 9 Afwegen Hoe groot zijn de kosten en baten van klimaatadaptatie- en -mitigatiebeleid voor het bodem-watersysteem (de ondergrond)? LANDMAN
Implementatie	10 Implementatie Welke maatregelen en ingrepen op het bodem-watersysteem zijn het meest effectief om aan de afspraken voor vermindering van de uitstoot aan broeikasgassen te voldoen (mitigatie)? LANDMAN 11 Implementatie Welke handelingsperspectieven voor bodem en ondergrond hebben publieke en private partijen voor klimaatadaptatie- en –mitigatiebeleid? INLEIDING / LANDMAN 12 Implementatie Hoe voorkomen / gaan we om met gevolgen van klimaatverandering (bodemdaling, waterbeheer, wateroverlast, verdroging en verzilting), hitte, veranderend grondgebruik et cetera)? IMPACT
Evaluatie	13 Evaluatie Welke maatregelen in het kader van klimaat adaptatie- en mitigatiebeleid voor bodem, ondergrond en landgebruik zijn onder welke omstandigheden effectief? LANDMAN Evaluatie Hoe dragen kleinschalige maatregelen bij aan klimaatadaptatie en –mitigatie op een groter schaalniveau voor de langere termijn?

Water

Bewustwording	1 Bewustwording Welke handelingsperspectieven hebben publieke en private partijen om het natuurlijk systeem te betrekken bij hun wateropgaven? En zijn / hoe worden zij zich van deze handelingsperspectieven bewust? LANDMAN
Statusbepaling	2 Statusbepaling Hoe kan de conditie van het natuurlijk systeem in zijn totaliteit worden bepaald en/of beoordeeld? En wat betekent deze kwaliteit voor de ecosysteemdiensten die kunnen worden geleverd? NATCAP
Systeemkennis	3 Systeemkennis Wat is de betekenis van een ingreep in het watersysteem voor de duurzaamheidsbalans van het totale natuurlijk systeem? IMPACT 4 Systeemkennis (toegevoegd) In hoeverre is de lokale bodemgesteldheid bepalend voor de invloed van water op het natuurlijk systeem? En is deze kennis te vertalen naar generieke maatregelen? IMPACT 5 Systeemkennis Welke waterkenmerken zijn van invloed op de lokale bodemgesteldheid en in welke mate? IMPACT
Afwegen	6 Afwegen Hoe geef je landmanagement en waterbeheer vorm binnen gebieden uitgaande van de balans tussen het natuurlijk systeem en wateropgaven (veiligheid, drinkwater, landbouw, natuur industrie, KRW-doelstellingen enz) en waarbij eenieder zijn verantwoordelijkheid neemt? LANDMAN 7 afwegen Hoe kunnen we gebiedsgericht kwalitatief en kwantitatief grondwaterbeheer vormgeven? LANDMAN 8 Afwegen (klimaat) Wat bepaalt of in Nederland actief grondwaterpeilbeheer bestuurlijk, technisch en financieel kansrijk is en in welke omvang? LANDMAN
Implementatie	7 Implementatie Hoe kunnen essentiële functies en processen van het bodem-water-sediment systeem worden ingezet om de hydrologische cyclus te reguleren? LANDMAN 8 Implementatie •Welke maatregelen (inclusief eco-engineering) zijn bij het gebruik van het bodem-water-sediment systeem door wie en wanneer in te zetten om de hydrologische cyclus te optimaliseren? LANDMAN 9 Implementatie Wat is optimaal peilbeheer gezien het natuurlijk systeem op een locatie in relatie tot gewenste functies en opgaven zoals tegengaan bodemdaling en paalrot naast ontwateringsbehoefte landbouw? LANDMAN
Evaluatie	10 evaluatie Hoe kunnen we wateropgaven zoals de (drink)waterlevering nu en in de toekomst, veilig stellen en wat betekent dit voor het natuurlijk systeem en strategische grondwatervoorraden? DEMAND 11 evaluatie Hoe werken ingrepen en de daaruit voortvloeiende veranderingen in de bodem, het grondwater of het water door naar andere domeinen, zoals de landbouw en de ruimtelijke ordening? IMPACT

Smart and healthy cities / Slimme gezonde stad

Bewustwording	1 Bewustwording Welke handelingsperspectieven zijn er om het natuurlijksysteem te betrekken bij het vinden van oplossingen voor de uitdagingen in stedelijk gebied? LANDMAN 2 Bewustwording Hoe maken we partijen bewust van de concurrentie tussen de diensten van het natuurlijk systeem en de gebruiksfuncties van de ondergrondse ruimte en het belang beiden te betrekken in afwegingen? DEMAND
Statusbepaling	3 Statusbepaling Wat is de rol van het bodem-watersysteem voor de realisatie van de circulaire stad (kringlopen vormgeven c.q. sluiten)? NATCAP 4 Statusbepaling Wat is de waarde (monetariseren / maatschappelijk rendement) van het stedelijk bodem-sediment-watersysteem en de diensten die het levert? NATCAP 5 Statusbepaling Welke impact hebben demografische en economische ontwikkelingen (krimp en groei, landeigendom) op het gebruik, de bestemming en het beheer van het natuurlijk systeem? LANDMAN Statusbepaling Welke functies gaan goed samen (in ruimte/tijd) of versterken elkaars werking in de stad en welke zijn concurrerend of maken andere diensten onmogelijk? DEMAND 6 Implementatie Welke (nieuwe) bedreigingen voor de kwaliteit van het natuurlijk bodem-watersysteem in de stad worden in de komende decennia verwacht en welke kosten zijn daarmee gemoeid? IMPACT
Systeemkennis	8 Systeemkennis Op welke wijze interacteert het natuurlijk systeem met het (beoogde) gebruik? IMPACT 9 Systeemkennis Welke bodemprocessen zijn belangrijk voor het leveren van diensten door het stedelijke bodem-water-sediment systeem (afbraak verontreinigingen, filteren water / lucht, bufferen van lokaal klimaat, tegengaan hittestress, fijn stof invangen) en (hoe) kunnen we het functioneren van het stedelijke bodem-water-sediment systeem verbeteren? NATCAP 10 Systeemkennis Wat is de impact van het (niet) benutten van het natuurlijk systeem en de kwaliteit hiervan op gezondheid en leefomgevingskwaliteit in de stad? IMPACT
Afwegen	11 Afwegen Hoe wegen we de bodembelangen evenwichtig af tegen andere (milieu)belangen (als: water, veiligheid, lucht, geluid, ecologie, economie, financiën, ruimtelijke kwaliteit en maatschappelijke opgaven) in de ontwikkeling en het beheer van stedelijke leefomgeving en hoe draagt bodem bij aan die belangen? LANDMAN 12 Afwegen Hoe kunnen we scenariostudies inzetten om in te spelen op de toekomstige ontwikkelingen in de stedelijke omgeving? DEMAND Afwegen Op welke manier kunnen er ‘trade-offs’ gemaakt worden tussen het natuurlijke en het artificiële systeem? IMPACT

Implementatie	13 Implementatie Hoe kan men het natuurlijk systeem inzetten voor op opgaven in het stedelijk gebied? Bijvoorbeeld door: LANDMAN - Bijdrage bodem en ondergrond aan transitie stedelijk waterketensysteem - Bijdrage aan klimaatbestendige leefomgeving - Bijdrage aan de energievoorziening van de stad - (Ecologische) concepten voor duurzame inrichting, kringlopen - Betere afstemming boven en ondergrond 14 Implementatie Waar liggen kansen voor geo- & eco-engineering in het stedelijk gebied? LANDMAN 15 Implementatie Hoe is 4D ruimtelijke ordening (x,y,z, en t) met een balans tussen benutten en gebruiken van het natuurlijk systeem en de ondergrondse ruimte in het stedelijk gebied te realiseren? LANDMAN 16 implementatie Hoe spelen we positief in qua kennisontwikkeling en innovatie op de voortdurend nieuwe uitdagingen die de ondergrond in de stad ons stelt? DEMAND
Evaluatie	17 Evaluatie Wat zijn de (meetbare) effecten van ecologische en building-with-nature concepten, inrichten op basis van groen-blauwe structuren en inzet van ecosysteemdiensten op de maatschappelijke opgaven in een stad? IMPACT 18 Evaluatie Wat zijn de baten (maatschappelijk rendement) van het benutten van het natuurlijk systeem in de stad, hoe verdeel je de lusten en de lasten en kun je met ontwerpen ook de kosten in tijd en per stakeholder regelen (mutual gain approach)? IMPACT

Mobility and transport / Mobiliteit en transport

Bewustwording	1 bewustwording Wat is –in het kader van duurzaam transport- de rol van de ondergrond bij het duurzaam verbinden van hoofdwegen met “aders” en “haarvaten”? DEMAND
Statusbepaling	2 statusbepaling Wat is de staat van ondergrondse infra en wat betekent dit met betrekking tot de vervangingsopgave en saneringsopgave van loze kabels en leidingen? LANDMAN
Systeemkennis	3 systeemkennis Waaruit bestaan interacties tussen ondergrondsysteem en aanleg van en bestaande boven- en ondergrondse infra, nu en in de toekomst? IMPACT 4 systeemkennis Treden er als gevolg van ingrepen ten behoeve van de mobiliteit en transport verstoringen op van de balans tussen de potenties van het natuurlijk systeem en de behoeften van de maatschappij? Waardoor kenmerken deze verstoringen zich en wat betekent dit voor de kwaliteit van het natuurlijk systeem? IMPACT
Afwegen	5 afwegen Welke factoren en argumenten spelen een rol bij de duurzame afweging tussen de aanleg van boven- of ondergrondse infrastructuur? Speelt behoud van de kwaliteiten van het natuurlijk systeem daarbij een rol? En hoe kunnen we met deze argumenten sturen op de afwegingen? DEMAND
Implementatie	6 Implementatie Welke technieken zijn te ontwikkelen i.k.v. duurzaam en hindervrij GWW (building with nature, bouwen op slappe bodem, hindervrij bouwen in en op de ondergrond)? LANDMAN 7 Implementatie Welke innovaties zijn mogelijk voor beheer, meten en monitoren van ondergrondse infrastructuren? LANDMAN 8 Implementatie Welke slimme functiecombinaties bij wegenbouw en – onderhoud en ecosysteemdiensten zijn mogelijk? LANDMAN
Evaluatie	9 Evaluatie Waaruit bestaan positieve en negatieve wisselwerkingen tussen ondergronds infrastructurele ontwikkelingen en het natuurlijk systeem en wat kunnen we leren van deze wisselwerking voor toekomstige infrastructurele ontwikkelingen in de ondergrond? IMPACT

Soil quality / Bodemkwaliteitszorg

Bewustwording	-
Statusbepaling	1 Statusbepaling Welke (nieuwe) verontreinigingen blijven een (potentieel) risico voor de gezondheid (drinkwater) of het ecosysteem? NATCAP 2 Statusbepaling Wat zijn nieuwe bedreigingen voor de bodem- en grondwaterkwaliteit? NATCAP/IMPACT
Systeemkennis	3 systeemkennis Hoe interacteren bodem, sediment en water en de stoffen daarbinnen (bodem-sediment-water-systeem)? NATCAP 4 systeemkennis Wat is de potentie van de bodem en ondergrond voor het produceren van medicijnen of het afbreken van verontreinigingen en hoe kan die potentie worden benut? NATCAP 5 systeemkennis Wat betekent de aanwezigheid van systeemvreemde stoffen voor de kwaliteit en de veerkracht (ziektewering) en andere kwaliteiten en functies van het natuurlijk systeem? NATCAP
Afwegen	6 afwegen Hoe kunnen de risico's worden bepaald van veranderend gebruik van bodem, water en land i.r.t. de kwaliteit (meer "open" bodems, zwemmen in grachten met schoon water, maar verontreinigd sediment)? En wat betekenen deze risico's in relatie tot de maatschappelijke behoeften? IMPACT
Implementatie	7 Implementatie Hoe gaan we om met (nieuwe) verontreinigingen voor het grond- (en drink)water (meten, monitoren en aanpakken, inpassen in de bestaande structuur van beheer van schone en diffuus verontreinigde bodems)? LANDMAN 8 Implementatie Hoe kunnen we de risicobeoordeling van bodemverontreiniging integreren in een risicoafweging voor het totale milieu? IMPACT 9 Implementatie Hoe verbeteren we de "governance" van bodemkwaliteitszorg in termen van organisatie, nazorg, professioneel opdrachtgeverschap, organisatie, handhaven en toezicht? LANDMAN 10 Implementatie Welke tools zijn er nodig om de nieuwe bodemkwaliteitszorg (inclusief bodembescherming) te ondersteunen? LANDMAN 11 Implementatie Hoe kan bodemkwaliteitsbeheer /-zorg (bodem en grondwater) worden verbonden met andere ondergrondthema's? DEMAND Implementatie Hoe kan bodembescherming bijdragen aan bescherming strategische grondwatervoorraden? DEMAND 12 Implementatie Hoe kunnen verontreinigde terreinen / saneringen met andere activiteiten worden gecombineerd en bijdragen aan gebiedsambities? LANDMAN Implementatie Hoe kan hergebruik brownfields (economisch, sociaal, cultureel) gestimuleerd worden? LANDMAN Implementatie Hoe kunnen stortplaatsen mee worden genomen in land management en een gebiedsaanpak? LANDMAN 13 Implementatie Hoe kan het grondverzet en de baggeropgave verder worden verduurzaamd? LANDMAN 14 Implementatie Welke (nieuwe, innovatieve duurzame en (kosten)effectieve) sanerings- en monitoringstechnieken kunnen worden doorontwikkeld? LANDMAN
Evaluatie	15 evaluatie Hoe kunnen de resultaten (inspanningen) van bodemkwaliteitszorg (gestage verbetering) worden gemonitord (welke indicatoren)? IMPACT

Energy supply / Energievoorziening

bewustwording	1 bewustwording Hoe wordt een goede discussie over de wenselijkheid de diverse bestaande en nieuwe energiefuncties in de (diepe) ondergrond georganiseerd (geothermie, schaliegaswinning, gasopslag etc) en indien wenselijk, hoe wordt draagvlak gecreëerd? DEMAND
statusbepaling	2 statusbepaling Welke potentie heeft de ondergrond in de transitie naar een duurzame energievoorziening? En wat betekent de energietransitie voor het gebruik en de functies in/van de ondergrond? NATCAP 3 statusbepaling Hoe komen we tot een gunstige businesscase voor toepassing van 'nieuwe' energiebronnen en –voorzieningen die gebruik maken van de potenties van de ondergrond? DEMAND
systeemkennis	5 systeemkennis Waaruit bestaan interacties tussen ondergrondsysteem en winning van brandstoffen / toepassing bodemenergie op verschillende ruimtelijke en tijdschalen (kwantiteit, chemische kwaliteit, fysisch, geotechnisch, microbiologisch)? IMPACT
afwegen	6 afwegen Hoe maken we keuzes tussen verschillende soorten energiewinning (nut en noodzaak, duurzaamheid, kosten en baten, risico-impact en acceptatie)? Welke afwegingssystematiek is geschikt en breed toepasbaar? DEMAND 7 afwegen Hoe maken we ruimtelijke afwegingen in relatie tot energiefuncties (winning, transport en opslag) in de onder of bovengrond (beïnvloeding – concurrentie – uitsluiting functies en effecten van ingrepen/gebruik in horizontaal en verticaal vlak en door de tijd)? LANDMAN
implementatie	8 implementatie Hoe kunnen we de potentie van de ondergrond voor duurzame energievoorziening beter benutten? LANDMAN 9 implementatie Welke kansen voor efficiënte functiecombinaties liggen er (zoals WKO – sanering van grondwater)? LANDMAN 10 implementatie Hoe kunnen we met behulp van de ondergrond energie efficiënt en duurzaam opslaan en transporteren (realiseren van warmtenetten, sluiten energieketens) en welke technologische kennis is daarvoor nodig? LANDMAN 12 implementatie Hoe kunnen negatieve effecten / gevolgen (hernieuwbaar, onomkeerbaar, beheersbaar) van verschillende soorten energiewinning worden gemitigeerd? LANDMAN 13 implementatie Hoe kunnen de rolverdeling van en samenwerking tussen markt, overheden, kennisinstellingen en burger worden geoptimaliseerd bij nieuwe energiefuncties in de ondergrond? LANDMAN
evaluatie	14 evaluatie Wat is de impact van 'nieuwe' energievormen op het natuurlijk systeem en wat betekent dit voor het systeem en de maatschappelijke opgaven? IMPACT evaluatie Welke impact heeft de energiemix op boven- en ondergrond in termen van ruimtebeslag, gevolgen (aardbevingen, bodemdaling), veiligheid, beheer van grondwatervoorraden etc.? IMPACT

Resource efficiency / Efficiënt gebruik grondstoffen

bewustwording	1 bewustwording Wat kunnen ondergrond en landgebruik bijdragen aan circulaire economie, waarin ecologie en economie elkaar versterken, zoals het sluiten van kringlopen en hergebruik van grond en water? NATCAP
statusbepaling	2 statusbepaling Wat is nut en noodzaak van grondstoffenwinning voor de lange termijn (Toekomstscenario's voor gebruik van grondstoffen bij het samenspel tussen zelfvoorzienendheid, geopolitieke afhankelijkheid, nationale en internationale schaarste, voetafdrukken, circulaire economie en transitie naar duurzame energievoorziening)? DEMAND 3 statusbepaling Hoe ziet de sedimentbalans op verschillende schalen eruit, waar is teveel / te weinig sediment en wat zijn gevolgen voor maatschappij? NATCAP / DEMAND
systeemkennis	4 systeemkennis Waaruit bestaan interacties tussen ondergrondsysteem, landschap en winning van grondstoffen? IMPACT
afwegen	5 afwegen Hoe maken we ruimtelijke afwegingen tussen verschillende gebruiksfuncties (inclusief winning grondstoffen) en hoe kan de inzet van ecosysteemdiensten daarbij (ook bovengronds/landschappelijk) worden geoptimaliseerd? LANDMAN 6 afwegen Hoe kunnen we het landschap versterken door, of mee laten delen in baten van grondstofwinning? LANDMAN 7 afwegen Welke beslissingen moeten we nemen in het systeem en in wet- en regelgeving om beter om te kunnen gaan met baggerkwaliteit en -kwantiteit ? LANDMAN
implementatie	8 implementatie Hoe geven we vorm aan hergebruik / dragen we bij aan circulaire economie? DEMAND - Kan een "materialenpaspoort" werken? Voor welke doelen? Ontwerpen voor hergebruik: waar rekening mee houden? - Hoe kunnen we sediment en grond (en vruchtbare teelaarde) op een veilige en kosteneffectieve manier hergebruiken? - Wat is het mijnbouw-potentieel (landfill-mining) van vuilstorten en andere afvalproducten die in de ondergrond beland zijn? - Welke technologische kennis is er nodig bij terugwinning grondstoffen? 9 implementatie Wat bepaalt de keuze voor de inzet van primaire en secundaire bouwgrondstoffen in de bouw/utiliteit en GWW-sector? DEMAND - Hoe kunnen secundaire bouwgrondstoffen nog beter (hoger in de keten) worden ingezet om winning primaire bouwgrondstoffen te reduceren? - Welke secundaire bouwgrondstoffen komen in de toekomst vrij (door sloop o.a.) en wat is de invloed hiervan op de winning van primaire bouwgrondstoffen in de toekomst? 10 implementatie Hoe kunnen we zoutcavernes op een veilige manier hergebruiken? LANDMAN 11 implementatie Hoe kan het natuurlijk systeem helpen om inputs van grondstoffen verlagen in een stedelijke, industriële en agrarische setting? NATCAP
evaluatie	

Cross-over themes / Dwarsverbanden

Governance including Safety and health and Dealing with insecurities / Governance inclusief veiligheid en gezondheid en omgaan met onzekerheden

- Bodem als “common”: hoe kunnen we lucht – water - bodem effectief inzetten om maatschappelijke opgaven op te lossen als we ze niet in eigendom hebben? LANDMAN
- Welke beleidskeuzes en regelgeving vormen een belemmering om duurzaam bodem- en landgebruik in de praktijk te bewerkstelligen? LANDMAN
- Hoe gaan we van een controlemodel naar een adaptief model voor het beheer van de ruimte? LANDMAN
- Hoe gaan we om met “game changers” (nieuw beleid, kennis, schandaal, ramp etc)? LANDMAN
- Welke kennis is nodig voor het ontwikkelen van risicomanagement en daaraan gelieerde maatregelen? LANDMAN
- Hoe kunnen we effectief werken aan integrale opgaven zoals gebiedsgericht grondwaterbeheer (met zowel generieke als diepgaande specifieke kennis, ruimte voor maatwerk, “T-shaped knowledge” en met aandacht voor de juiste processen)? LANDMAN
- Hoe zetten we pilots in bij beleidsontwikkeling om mismatches tussen beleid en praktijk te voorkomen? LANDMAN
- Hoe brengen we de toepassing van groen-blauwe structuren van papier naar praktijk? LANDMAN

Knowledge base / Kennisbasis en vaardigheden

- Hoe houden bedrijven, overheden en burgers de kennisbasis rond het natuurlijk systeem en landgebruik op een voldoende niveau (kennismanagement, scholing, samenwerking)? DEMAND
- Hoe komt nieuwe kennis bij overheden terecht? DEMAND
- Hoe kunnen we leren van ervaringen en kennis uit het buitenland? DEMAND
- Hoe organiseer je effectief leerprocessen? DEMAND
- Hoe voorzien we deelnemers aan “bottom-up” initiatieven van de juiste informatie (bijv. i.r.t. stadslandbouw / bodemkwaliteit) en hoe zorgen we dat de kennis vanuit deze initiatieven ook bij anderen terecht komt? DEMAND
- Wat is er nodig rond bewustwording en onderwijs rond ondergrond (bijvoorbeeld jaar van de bodem, bodemdierendag, -bodem in onderwijs, GLOBE)? DEMAND

System knowledge / systeemkennis

- Hoe werkt het natuurlijk systeem en wat betekent dit voor verschillende landgebruiksvormen? NATCAP
- Wat is de connectiviteit binnen het systeem (chemisch, biologisch, fysisch)? NATCAP
- Hoe kan het bodem-sediment-water systeem worden gemonitoord om meer begrip te krijgen van de werking van het systeem?
- Welke invloed heeft het bodem-sediment-water systeem op maatschappelijke ontwikkelingen? IMPACT
- Wat zijn de 4D (x,y,z en t) effecten van landgebruik en ingrepen in het natuurlijk systeem? IMPACT
- Wat is de flexibiliteit van het natuurlijk systeem onder invloed van ingrepen? IMPACT
- Wat is het gecombineerde effect van kleinschalige ingrepen en maatregelen op het functioneren van het gehele bodem-sediment-water systeem? Wat betekent dit voor de potentie van het bodem-sediment-water systeem om bij te dragen aan maatschappelijke opgaven? LANDMAN
- Hoe gaan we op de juiste manier om met schaalniveaus en afbakening van systemen irt systeemkennis? LANDMAN

Valuation of the SSW-system (ecosystem services) /waardering van het natuurlijk systeem

- Wat is de (belangrijkste) bijdrage van het bodemecosysteem aan natuurlijk kapitaal en welke systeemkenmerken zijn hiervoor bepalend? NATCAP
- Hoe kunnen we deze systeemkenmerken optimaliseren of herstellen? NATCAP
- Is organisch stof dit kenmerk (betekenis van organisch stof voor bodemfuncties:bodemvruchtbaarheid, infiltratie, carbon storage, filtering, soil resilience)? NATCAP
- Wat is de betekenis van bodem(leven) voor maatschappelijke opgaven? NATCAP
- Wat is de NATCAP
- Is er een graadmeter aan te wijzen voor goede bodemkwaliteit en kan deze worden uitgewerkt tot communicatiemiddel, monitoring-onderwerp en herstelmaatstaf? NATCAP
- Hoe kunnen we het ecosysteem op een duurzame manier benutten (van “weten wat het ons te bieden heeft”, implementatie via building with nature concepten en eco-engineering, tot beëindigen van gebruik en herstel)? LANDMAN
- Wat zijn mogelijkheden van ecosysteemdiensten en hoe optimaliseren, waarderen en verzilveren we die? LANDMAN
- Hoe kunnen bedrijven / industrieën bepaalde diensten leveren met hun bodem/oppervlakte om diensten te leveren voor de omgeving ? LANDMAN

Data and information / data en informatie

- Wat kan (big/open) data betekenen voor omgaan met natuurlijk systeem en landgebruik voor verschillende stakeholders? LANDMAN
- Hoe krijgen we betere afstemming / eenduidigheid binnen informatie van 'landelijke' portals (bijvoorbeeld informatiehuizen aan de laan van de leefomgeving, atlas natuurlijk kapitaal)? LANDMAN
- Hoe verbeteren we data(beschikbaarheid) voor monitoring en modellering? LANDMAN
- Hoe verbeteren we vastlegging, uitwisseling en gebruik van ondergronddata op nationaal en Europees niveau? LANDMAN
- Hoe kan data vertaald worden naar informatie die gebruikt kan worden in de besluitvorming? LANDMAN
- Welke schaalgrootte voor informatie is benodigd voor landbeheer?
- Wat kunnen observatoria (landschapsobservatorium, bodemobservatorium) bijdragen aan bruikbare data en kennis? LANDMAN
- Hoe ontsluiten we de kennis en informatie die buiten de BasisRegistratie Ondergrond (BRO) valt (natuur, water, klimaat, bodembiologie, andere GOAL informatie: (Gegevensvoorziening Omgevingswet voor Activiteiten in de Leefomgeving, uitvoeringsprogramma digitalisering ikv de omgevingswet))? LANDMAN

Landuse / Landgebruik

- Hoe ziet de toekomstvisie (omgevingsvisie) op het gebruik van de (ondergrondse) ruimte eruit in Nederland? DEMAND
- Welke (locatie)specifieke ecosysteemdiensten zijn in te zetten om bepaalde functies te kunnen realiseren in een gebied en wat zijn de mogelijkheden van ecoengineering of building with nature hierbij? NATCAP
- Hoe ziet optimaal landbeheer er uit? LANDMAN
- Hoe geven we input aan de discussies rondom duurzaam landgebruik over secorale grenzen heen en met medeneming van verschillende toekomstbeelden? LANDMAN
- Hoe kunnen we omgaan met landeigenaarschap in relatie tot de visie op duurzaam landgebuik? LANDMAN
- Hoe is duurzaam landgebruik te optimaliseren, mede op basis van bodemkwaliteiten, op verschillende schaalniveaus? LANDMAN

18. The United Kingdom

Report by Paul Nathanail, Matt Ashmore

18.1 Executive Summary

18.1.1 English version

Societal challenges

Given the overarching INSPIRATION challenge of growing a low carbon, resource efficient economy with a sustainable supply of raw materials, the UK realises that it can meet some of its own needs but also depends on imports from elsewhere.

The key theme is to ensure a firmer evidence base on which to make better decisions in the short term that will have long term consequences. This will allow the unavoidable conflicts between different land use decisions and the need for compromise at various scales to be made in a transparent, objective-oriented approach.

R&I priority topics

Several NKS independently highlighted the need for research into landscape scale processes and a deeper understanding of natural systems. The move towards understanding the services offered by ecosystems needs to be coupled to the emerging concepts of natural capital to that land use decisions can be made oon a basis of an investment with clearly understood risks of adverse consequences and likely returns on investment over specific time scales. Such a value based approach builds on, but goes beyond, scientific knowledge.

The operationalisation of the related concepts of ecosystem services and natural capital will require both research and knowledge transfer activities if the worst decisions are to be avoided.

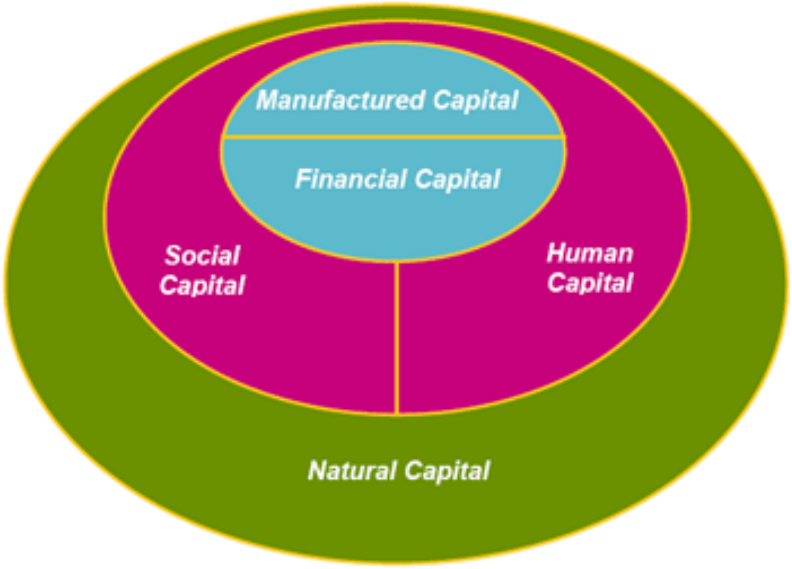

Figure 1 Five capitals (https://www.forumforthefuture.org/project/five-capitals/overview).

Natural capital is environmental assets, such as soils, from which beneficial services flow supplying resources to the economy, for example, agricultural crops, and disposing of its wastes, such as treated sewage effluent (POST 2011).

Science-policy-interface

Scientists need to be encouraged to deepen our understanding of complex natural systems and develop predictive models that can inform decision makers, including policy formulation. As such researchers need to be able to be able to catalyse challenges to existing policy and practice without crossing the line into pure advocacy or activism.

Funding options

The UK has a long history of varied funding mechanisms and the key funders expressly welcomed the opportunity to collaborate with partners to co-fund research of mutual interest.

The funding mechanisms need to be such that the bureaucratic effort of implementing them is commensurate with the amount being distributed and the need to maintain fiscal prudence and accountability.

A greater degree of flexibility in the medium term (2-3 years) is needed to repond to rapidly emerging societal concerns such as epidemics or natural disasters.

Republic of Ireland

The evidence from one workshop delegate and one interviewee from the Republic of Ireland are included in this report but this is not intended to be a representative statement on the situation in Ireland.

18.2 Methodology followed

This national report (i.e. INSPIRATION deliverable 2.5) reports the information collated for The UK from the national workshop (8 & 9 July 2016) and 17 national key stakeholder (NKS) interviews (Annex Ia) through a series of semi structured interviews. The information was collated in accordance with INSPIRATION D2.3 “Template for national information collation”. Details of these NKS are provided in Annex I. The desk study was based on documents as suggested by NKS. These are listed in Annex II. NKS were offered anonymity with respect to their comments and are hence referred to in this report by a code.

A copy of this report has been sent to the workshop attendees and NKS. An update will be produced if any substantive comments are received.

The United Kingdom has a central government and devolved administrations for Scotland, Wales and Northern Ireland (Cabinet Office 2010). Environment and land use planning are in general devolved matters. Some NKS represent bodies with remits limited to one of the four countries whereas others have remits extending across the whole of the UK and potentially beyond that too. Where a comment is limited to one of the countries of the UK this is reported.

18.3 Research and Innovation (R&I) needs

18.3.1 Societal challenges and needs

The UK has a long standing plan led approach to land use management. This has been essential in ensuring the complex, inter-related and often conflicting demands for land are balanced and benefits maximised while impacts minimised. At present there is an over arching planning policy but land use plans are devolved to local authority and county council (waste and minerals) level.

The Centre for the Protection of National Infrastructure (CPNI) (Cabinet Office 2010) protects national security advises on 'putting in place, or building into design, security measures or protocols such that threats may be deterred, detected, or the consequences of an attack minimised'. The national infrastructure is categorised into thirteen sectors (with those of most relevance to Inspiration highlighted in bold):

communications
emergency services
energy
financial services
food
government
health
transport
water
defence
civil nuclear
space
chemicals

The Cabinet Office (2010) recognises soil dessication as a threat to CNI

An analysis of the UK National Risk Register of Civil Emergencies (Cabinet Office 2015) shows that water as a hazard and a life essential, energy and food security are key concerns.

Under the overall societal challenge being tackled by INSPIRATION of “Growing a low carbon, resource efficient economy with a sustainable supply of raw materials” the workshop and various NKS identified a range of challenges that require fundamental research or knowledge transfer or some combination.

The workshop attendees expressed that there was a pressing need for a “National Plan” – Land Use Strategy – for the UK with a full understanding of land uses/ land use changes and the costs and benefits associated with each.

Contribute to food security and food safety (151109, 151104); 151124 – in the context of land contamination.

The workshop indicated that food security must also be seen in the context of biocrops and biofuels: which of these resources are we content to import and which should we produce and why? How should this policy be encouraged/ enforced? Should impacts be quoted *per capita*? Ultimately, how much do we want to consume? How do we optimise the location, bearing in mind that this includes the low-carbon, resource-efficient, sustainable supply chain and its vulnerability, and the consumers? How do we encourage the production’s siting in this optimium location?

Ensure secure supplies of water for a range of purposes. ‘Safe and sufficient drinking water’ is cited, with 151109 including irrigation water for crop production and water for livestock health. The workshop expressed the need to understand the land use impacts on water resources, and vice versa.

Reduce raw material and resource consumption, Ensure efficient use of natural resources; 151104. 151109 indicated water as a natural resource of concern, and also nutrients, particularly Phosphorus and Nitrogen use efficiency.

How should use and impacts be measured and quoted? Per capita? How do we optimise the location, bearing in mind that this includes the low-carbon, resource-efficient, sustainable supply chain and its vulnerability, and the consumers? How do we encourage the production’s siting in this optimium location?

In the case of finite resources, which does the UK possess? Which are exploitable economically and which are exploitable in ways that are socially acceptable? For example unconventional gas exploitation, or particular materials or aggregates are heavily contested. Different countries have taken different approaches. For example Scotland actively seeks to develop conventional oil and gas – both onshore and offshore – but has banned unconventional gas exploration. England has a small but growing on shore conventional hydrocarbon sector but government is keen to encourage unconventional gas exploration. The planning permission for the first groundwater quality monitoring boreholes for shale gas were awarded in early 2016 and the outcome of the planning permission for the first exploratory boreholes is currently pending. An exploration borehole for onshore oil was recently reported to have been successful.

For each of energy, water and other material requirements the key societal challenges to understand and seek to mitigate were identified by the NKS and workshop.

Contributing to climate change mitigation and societal adaptation (151109, 151104);

Contributing to a healthy living environment. 151104. 151109 recognised that there are challenges to be faced in the national diet that farmers, as primary producers, could help address. 151124 noted the need to mitigate the effects of land contamination and water pollution.

Ensuring a secure infrastructure for distribution of energy and water as well as interception of waste and pollutants. 155109 indicated the importance of an efficient energy and water supply network.

151104 highlighted the protection of ‘intrinsically valuable natural features/assets’.

151109 noted the need for climate change related maintenance of food supply. The link between Food & health would have impacts on primary food production. Soil degradation and soil health, including biocontrol of soil pathogens, was a prerequisite to maintaining domestic yields. The availability of and competing demands on water was becoming a pressing issue that the present strategy for unconventional gas exploration may well exacerbate.

151109: Funding for the work of AHDB comes from Industry Levies and is ring-fenced for the particular sector. AHDB then prioritise investments in research and knowledge transfer (KT) taking into account overlaps between sectors. All investments are intended to help produce profitable businesses whilst being aware of the environmental and societal drivers are around the decisions being made.

151112A: Contributes to food security and food safety to a much lesser extent. We have, along with other public bodies, a role in ensuring secure supplies of safe drinking water. We also carry out peripheral work on biomass, some activity in waste reduction, and efficient natural resource consumption. 151112A contributes to climate change mitigation and societal adaptation in terms of GHG emissions, carbon accounting, reducing fertiliser use, runoff into water courses. This contribute to a healthy living environment and has marginal feed into extreme events with respect to climate change and infrastructure.

Natural Capital accounting and valuation of all benefits and services is of growing importance and is trying to move towards a systems approach. The science needs to move away from easily seen entities (bee counts; location of nature reserves). We are still some distance away from being able to apply this understanding to decision making and as such is a key research need.

151112B: feeds into “Contribute to food security and food safety”; Ensure secure supplies of safe drinking water; Reduce raw material and resource consumption, Ensure efficient use of natural resources; Contribute to climate change mitigation and societal adaptation; and indirectly contributes to a healthy living environment;

In addition ‘Protection of the environment’ was given – the currently being formulated “25 year Environment Plan” that DEFRA is producing does not cover Wales which has its own plans: Natural Resource Management approach and statement that are broader as they cover more factors and not just biodiversity[55].

151118: Contribute to food security and food safety, Reduce raw material and resource consumption, Ensure efficient use of natural resources and Contribute to climate change mitigation and societal adaptation. In addition, Resource efficient circular economy in the UK was an extra challenge.

[55] An animation explaining the Welsh Government’s approach towards natural resource management is at: http://gov.wales/topics/environmentcountryside/consmanagement/natural-resources-management/?lang=en

18.3.2 Topics / research needs to include in the SRA

UK-1 Efficiency of primary food producers, while recognising the associated environmental and societal needs.

There are primary food producer organisations across Europe aiming to provide the same function using a variety of mechanisms, as well as links to bodies in for example South Africa, Australia and Canada where similar problems are faced, and all divisions work or collaborate internationally where there is a benefit to UK producers to do so.

Greenhouse emissions from livestock and broadacre arable crops are key drivers, but it's important to recognise where improvements in business efficiency, for example crop nutrient management plans, can reduce emissions.

How does improving supply chain efficiency affect the pressure on land use (e.g. by ensuring more, good quality produce reaches the ultimate consumer?)

Specific research questions (following the conceptual model of INSPIRATION)

Demand	Demand for food will grow with the population. However improved efficiency can reduce demand by reducing wastage.
Natural capital	Improving primary production efficiency will help in the stewardship of natural capital so that it continues to be able to offer beneficial services.
Land management	The way land is managed influences the efficiency of primary production.
Net impacts	Improved primary production will help contain our ecological footprint.
Justification	Of interest to all in the supply chain.

UK-2 Soil and groundwater remediation

Soil and groundwater remediation is difficult to achieve so it is best to preserve what we already have. Recent reviews of progress in groundwater remediation in the USA and elsewhere have shown that at the present rate, we are centuries away from restoring the groundwater to the quality before industrial pollution took place. Technological advancements with new materials and novel combinations of pre treatment, treatment and post treatment technologies could help accelerate progress.

How can new treatment materials, new technologies and new combinations of technologies be brought to market more quickly in more EU MS than has been the case in recent decades?

Specific research questions (following the conceptual model of INSPIRATION)

Demand	Demand for water will be mitigated by better groundwater remediation.
Natural capital	Rapid and more effective progress on soil and groundwater remediation will help steward our natural capital.
Land management	Remediated soil can be reused helping avoid urban sprawl and the consumption of green field (previously undeveloped) land. The innovation requested would help improve economic performance, reduce environmental impact and amplify the social licence to operate and hence contribute to more clearly sustainable land management.
Net impacts	Reduced resource consumption and enhanced soil and groundwater resource.
Justification	The present rate of progress is too slow and the net impact of current approaches to soil and groundwater remediation is not optimal.

UK-3 Soil 'Regeneration'

It is widely claimed that an increase of soil organic matter (SOM) by 20% would be beneficial but how much this is needed is contested. Research is being carried out at Rothamsted & Lancaster University in this area. However a lot of resources and money could be committed without understanding what will be delivered. The origin of the 20% figure is unclear.

How to increase to Soil Organic Matter in poorer soils, and what level is achievable, desirable, beneficial? Sharing lessons in best practice, costs & benefits in peatland restoration would be valuable.

Specific research questions (following the conceptual model of INSPIRATION)

Demand	By restoring local soil, the need to exploit and perhaps consume soil elsewhere is reduced. The amount of soil restored is likely to be a fraction of any soil conserved elsewhere giving a synergistic return on soil restoration investment.
Natural capital	Soil is a limited, quasi-non-renewable resource and improving its fertility and ability to act as a physical and chemical buffer will enhance natural capital. To what level should soil organic matter be increased?
Land management	Improved soil would yield enhanced ecosystem services, including yields, and hence reduce demands on land elsewhere. How should soil organic matter content be increased?
Net impacts	Improved soil would be able to offer enhanced ecosystem services and locally to the point of demand.
Justification	The requested research would deliver a better evidence base for specific policy targets on soil organic matter content.

UK-4 Natural systems

A better understanding of how natural systems behave and what processes are operating is needed to understand better the effects of different courses of action (deliberate or accidental) in order to inform Policy- and decision- makers in the UK and abroad in trying to avoid 'unintended consequences' arising from the complexity of natural systems.

How can we link in ideas on ecosystem services and 'soil resilience'? How does soil quality affect the wider system (and vice versa)? What are the economic implications of soil degradation, and what evidence and indicators should be used to quantify degradation?

Specific research questions (following the conceptual model of INSPIRATION)

Demand	Life depends on healthy functioning of natural systems. Rapid, particularly anthropogenic, perturbations of these systems create consequences in excess of the benefits of the actions that led to the perturbations.
Natural capital	Unforeseen or unintended degradation of the environment erodes natural capital unnecessarily.
Land management	Predictive models based on a better understanding of natural systems will help inform land use management.
Net impacts	Better understanding and associated predictions to inform decision making will reduce unintended or unforeseen environmental degradation.
Justification	Competing demands on land use are growing in many parts of Europe and in the UK. We now realise that natural systems are complex and operate at various scales – and we only have partial understanding of their behaviour.

UK-5 Demand for soil/ land resources, imports and exports

The international dimension of food supply and hence food security is important. The UK does not see itself as being isolated in terms of food – it both imports and seeks to export foodstuff).

Need a better understanding of the whole life cycle of food production, transport, consumption and waste to discern the balance between domestic, import and export.

Specific research questions (following the conceptual model of INSPIRATION)

Demand	Land owner recognise that soil is a finite resource but one with a long tail of productivity. Improved understanding of the life cycle of soil related
Natural capital	How can stewardship of the soil component of natural capital be improved to help food security in the EU and in countries which export food to the EU?
Land management	Improved understanding of the geography of soil services (including of the products we obtain from soil) will help allocate resources and reduce unnecessary consumption & waste.
Net impacts	Reducing over consumption and waste will mean reduced environmental impacts and deliver savings to those behaving profligately.
Justification	A whole life cycle approach to food will reduce inefficiency, including waste, and thereby release resources for others and other purposes.

UK-6 Competition between land-uses (land-use conflicts)

It is recognised that there are competing and often mutually excluding land uses. How should land use conflicts be resolved? E.g. Is it more appropriate to build on poor quality agricultural soils rather than brownfield land? What instruments are needed to avoid / minimise impacts (feedback to decision-making process). Spatial analysis of distribution and level of Natural Capital to inform decision making. Techniques and technologies to assess (productivity) and value land resources.

Specific research questions (following the conceptual model of INSPIRATION)

Demand	Better understanding of the consequences of alternative uses of land are needed to ensure the most important – rather than obvious or even urgent – land use is permitted to proceed.
Natural capital	Better survey of the distribution of natural capital is needed to inform decisions on competing land uses.
Land management	Predictive models of ecosystem services associated with natural capital would help inform decision makers and help prevent inadvertent consumption of natural capital.
Net impacts	Better instruments are needed to avoid negative impacts.
Justification	There is an urgent need to improve the basis and robustness of land use allocation among competing land uses.

UK-7 Targeting outputs

Practical, pragmatic effort needs to be expended in targeting outputs to relevant end-users and in linking the fundamental science through to policy and (improving) regulation.

Growing awareness of the need to actively protect and restore our natural capital and to foster and maintain ecosystem services has been met with growing efforts to regulate activities that could unnecessarily erode capital or hinder the delivery of services. The interdependency and interconnectedness within natural systems is beginning to be understood however policy instruments and their implementation is likely tobe lagging behind this understanding.

Specific research questions (following the conceptual model of INSPIRATION)

Demand	How can the impact of policies intended to protect natural capital and foster ecosystem services be reliably predicted over medium term timescales?
Natural capital	How can natural capital be understood in ways that help policy formulation and implementation over short timescales when the impact of these timescales may not be fully realised until much later?
Land management	Land use policies involving the erosion of natural capital have lasting, occasionally permanent , effects on land. How can those effects be predicted and properly evaluated before policies are implemented?
Net impacts	There is a hunger in government to identify and modify or eliminate unnecessary regulatory burdens however demonstrably satisfying this hunger is proving challenging.
Justification	Increasingly sophisticated and multiple land uses require more interconnected and agile policies and implementation of those policies.

UK-8 Competition between land uses (land-use conflicts)

The effects of loss of high quality agricultural land to other land uses, e.g. forestation and to development. There appears to be a lack of research in the UK. There is no research quantification of loss of good quality agricultural land to development.

Some forms of natural capital are non renewable and some are interchangeable. Discerning the scale and nature of capital erosion by some land uses at the expense of others requires a deeper understanding of the natural processes land uses create, foster and hinder.

Specific research questions (following the conceptual model of INSPIRATION)

Demand	Many forms of land use are possible on any specific parcel of land but not all are necessarily desirable… there.
Natural capital	The forms, nature and immutability of different forms of natural capital need to be mapped and evaluated if loss of one form of capital can be justified by creating another form which offers essential services or enhanced value.
Land management	Understanding the site specific springs of natural capital can help inform decisions about the net effect of alternative land use futures.
Net impacts	By better understanding the springs of value associated with different land uses, unwanted adverse impacts can be avoided or reduced.
Justification	When alternative land uses are competing for the same space, criteria and constraints must be selected to help inform decision making. In the absence of deeper scientific understanding of the link between the environment (including the sub surface environment) and the value or services other criteria will dominate the decision making process.

UK-9 Important areas of technical innovation include new techniques to understand

The microbiology of soil to help assess biodiversity and so understanding impacts and optimisation of land management.

A growing understanding of the potential for natural attenuation of groundwater pollution over the past two decades has allowed less intensive remediation solutions to be more widely deployed. A transition from empirical observations of contaminant loss to mathematically describable understanding of the biological processes causing that loss have facilitated targeted biostimulation and on occasion bioaugmentation.

The microbial biomass of soil is appreciated as being an important component of the processes that deliver valued ecosystem services. However there are challenges in understanding how soil bacteria and fungi behave and how they respond to different land uses.

Specific research questions (following the conceptual model of INSPIRATION)

Demand	Making more effective use of soil microbial biomass to achieve desired goals of soil restoration or conservation can be achieved if the inter relationship between soil function and microbial biomass is mathematically describable.
Natural capital	Microbial biomass is both part of natural capital and a contributor to other forms of such capital.
Land management	Better understanding of the behaviour and resilience of soil microbial biomass can help optimise soil and groundwater intervention measures.
Net impacts	Better characterisation of soil microbial biomass will enable more targeted interventions to protect or restore degraded or polluted soil.
Justification	Improved understanding of soil microbial biomass is an essential objective if the response of natural systems to perturbations are to be reliably predicted and hence taken into account in land management decision making.

UK-10 Landscape scale solutions

Solutions across multiple farms that improve biodiversity and soil management and productivity are needed to replace field or farm scale intervention. Funding farmers has had only a modest/ limited impact. Such an approach would sit comfortably within the Defra Sustainable Intensification Platform (SIP) and is endorsed by the WRAP *Food futures* report (WRAP 2015). Integration has the potential to manage at the landscape scale and not the individual environmental media or simply to maximise crop yields. This can be at catchment-scale with management involving collaboration of individual farmers. The role of Precision Agriculture in the improvement/conservation of soil quality – new techniques and technologies to assess/map – needs to be more fully explored and then put into operation.

Specific research questions (following the conceptual model of INSPIRATION)

Demand	How can the Fusion of geospatial intelligence and deeper understanding of how natural systems function be used to maintain ecosystem services with a lighter hand intervention?
Natural capital	How can precision agriculture contribute to natural capital stewardship?
Land management	How can automated, accurate precision agriculture techniques be used to increase the granularity of land management decisions?
Net impacts	Better use of precision agriculture coupled with higher resolution understanding of how natural systems vary can help optimise the benefits of chosen land use trajectories.
Justification	There is an opportunity for SMART farming.

UK-11 Assessing the values of primary and secondary production

For example, a high value secondary producer may rely on a relatively low value primary producer, e.g. Scottish Barley is an essential feedstock for the Scotch Whisky sector that is reportedly worth £5billion per year to the UK economy (Scotch Whisky Association 2015).

A “follow the thing” approach to high value products can help identify vulnerabilities and areas where improvements in what at first sight seems a low value part of the process can deliver significant dividends.

Specific research questions (following the conceptual model of INSPIRATION)

Demand	How can the production high value products such as luxury foodstuffs be improved?
Natural capital	Natural capital combined with intellectual capital and scarcity can result in high value products from seemingly low value raw materials. Such value can be used to protect natural capital.
Land management	Improved production of low value raw materials can help maintain traditional industries and the landscapes they both depend on and help conserve.
Net impacts	Seemingly unworthy investments in improving low value products can have much greater benefits down the line and up the value creating chain.
Justification	High value products can provide substantial social benefits and contribute to the local economy thereby reducing the need for local communities to turn to more detrimental and less sustainable activities.

UK-12 Farming practices to create valuable (enjoyed) environments

E.g. uplands and grouse shooting, sheep grazing and patchwork of fields and river margins in the low lands are very dependant on how farmers perceive themselves as guardians to their environment.

Long-time horizons often matter in agriculture – succession from generation to generation is important in some cases, whereas businesses renting land brings about shorter time horizons. Business (land rental over a series of say 3-5 year sequences) and land owning (estate management) objectives need to be managed.

Farming is increasingly being seen as a way of not only delivering food (and perhaps biofuel) but also as a means of mitigating natural hazards (notably flooding), enhance biodiversity and support leisure activities in the countryside.

A systematic understanding of these environments is needed. Natural England has carried this out using “Landscape Character Areas”. “These are single unique areas which are the discrete geographical areas of a particular landscape type. Each has its own individual character and identity, even though it shares the same generic characteristics with other types” (Natural England 2014).

How does each of these elements value the other, and how should they value it? How can multiple land uses be managed in ways that optimises their value and reduces their adverse impact? Given the slow rates at which change often comes about, how can reliable predictive models be used to inform decision making? Can these models be used at different scales – from field scale to national character area[56] scale?

Specific research questions (following the conceptual model of INSPIRATION)

Demand	By looking for synergies between farming for food and other benefits, local supply of services will be greater and hence demand will be reduced.
Natural capital	Farming practices that deliver a range of benefits will enhance both the stock of natural capital and the allocation of funds to protect natural capital.
Land management	How can multiple land management objectives be achieved in a reasonable manner?
Net impacts	How can making optimal use of land for a variety of purposes be done in a way that makes for better stewardship?
Justification	The long timescales over which farming practices affect change represent a considerable challenge.

[56] English Nature (now Natural England) has developed a landscape classification for England – while the research need came from Ireland the National Character Area approach is extendible to other MS. https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making

IR-1 (Generic) Risk Assessment of Contaminated Soils

Management of contaminated land in Ireland lags behind much of Europe, partly because it has a less-industrial past than many partners. It lacks almost all necessary elements from primary legislation to practical tools and guidance and, though it is a sporadic problem, each instance entails a lot of time, money and effort because of the lack of a coherent approach. It requires research to transfer basic tools and processes into an Irish context, eg geology, population, demographics etc.

Specific research questions (following the conceptual model of INSPIRATION)

Demand	Improved soil and groundwater will allow demand to be met more locally than would otherwise be the case.
Natural capital	Natural capital would be enhanced.
Land management	A closer proximity between supply and demand would mean less need for land for ancillary activities to overcome greater separation.
Net impacts	Improved soil and groundwater quality will contribute to better stewardship.
Justification	Many countries have mature contaminated land management policies and practices (e.g. UK & NL) while others have dysfunctional ones or effectively none at all. Considerable funds are spent by both private and public sector and knowledge transfer is needed to help ensure that expenditure delivers tangible returns.

IR-2 Pragmatic appraisal of environmental technologies in an Irish setting

There is inertia in the application of technologies such as remediation methods and investigation techniques in Ireland, either because people are unwilling to try 'new' techniques, or try new techniques that are wholly inappropriate – eg for the problematic drift geology in much of Ireland. Pragmatic appraisals of the capabilities and limitations of technologies would help better application.

What problem does any specific technology aim to address? What evidence of its performance is there? To what extent is that evidence relevant to Ireland (and other MS)? What extra evidence is needed to improve confidence in the performance and that any residual negatives will tolerable?

Specific research questions (following the conceptual model of INSPIRATION)

Demand	
Natural capital	Ireland's natural capital will be enhanced by appropriate deployment of environmental technologies but it would be degraded by inappropriate use of perhaps even the same technologies.
Land management	Making better use of existing technologies will help keep more of Ireland's land in beneficial use.
Net impacts	Better use of technology will help improve Ireland's soil environment.
Justification	National contexts still vary despite increasing similarity in legislation across EU MS. Climate, culture and geology will influence the operating window of any technology hence the need to demonstrate that for Ireland, and indeed other MS, circumstances any given technology is fit for purpose.

18.4 Experiences regarding connecting science to policy/practice

18.4.1 Use of knowledge

The understanding of science varied among the NKS, reflecting their disciplinary background. General trends of objectivity, neutrality and meticulously obtained were detected.

151109: existing and new science and its interpretation with respect to specific sectors and integration across disciplines (soil science, crop physiology, genetics etc.). New knowledge must be built on to deliver additionality.

151112A: knowledge that arises from the scientific process, testing a hypothesis. Turning that into knowledge via peer review, published, debated and accepted. One of the things we constantly say is that there is no certainty in science and you are not seeking certainty and there must always be explanations of uncertainty, errors and caveats.

151112B information or evidence that helps inform change.

151118 experimentation – hypothesis formulation and testing – evidence based conclusion – iterative

151124 evidence-based decision making

Scientific knowledge is an essential foundation for most of the NKS. It could be argued that the funders seek to support the creation of knowledge that is of societal value.

151109: within the organisation with respect to the research it commissions, they would expect to see technical reports, briefing notes, peer review papers, publicity and outreach materials (for farming press), it would also be used to respond to consultations, inform policy. New information would be interpreted to farmers, growers and supply chain to improve business performance.

151104 uses ‘scientific knowledge’ to inform policy formulation and negotiations at a National and trans-national level.

151112A: scientific knowledge is used to communicate with (non-scientific) policy teams and inform ministers and their responses to e.g. parliamentary questions. Robust transparent science is needed, often from first principles.

151112B is the core of what they do, whether at operational or policy level, everything is subject to challenge and needs to be properly evidenced to back that up.

151124: decision making process for rick assessment or remediation strategies, for example in signing off sites.

There is a widespread realisation that there is a large amount of even reliable peer reviewed literature and some sign posting to the most relevant and reliable was needed. A wide range of sources of (scientific) knowledge were reported by the NKS as being useful in their daily work. For the end user and funders however reliance of a close network of specialists, often researchers, in identifying new knowledge was very important.

151109: in addition to the information gained from commissioned research, they also acquire information from scientific papers; cost of access is an issue but literature review is part of commissioned research to establish knowledge gaps. Business consultants are also used to understand implications of the commissioned research and understand the return on investments. Internal expertise and communication is good, and ad hoc working groups may be convened.

Television and local radio are used to convey information to the public, where they have wider interest, e.g. items on potatoes and health, and the recent concern over the carcinogenicity of sausages and bacon.

Key portal websites are used to keep abreast of what is considered to be significant and noteworthy, including: Europa, RCUK, ENDSReport, US EPA.

151104: Journal papers are used.

151112A: Consulting our network of subject specialists, sometimes yet-unpublished work scientific articles; scientific papers are useful but they need to be simplified for a non-technical audience; along with grey literature[57]*.*

151112B: knowledge is acquired from multiple sources: from peer reviewed research, specialists, colleagues, undertaking research independently. JRC and EEA reports are strategically important. Searching for peer reviewed literature is difficult, but obtaining it isn't – we need to know what the paper is before they can obtain it.

151118: takes information from most avenues, from peer-reviewed research, to experts, experience and both academic and industrial conferences.

151124: tends to get knowledge from consultants, and other industry professionals (via word of mouth or networks/conferences/training courses), from secondary websites such as US EPA, ATSDR and EA.

[57] Grey literature has been defined as: 'That which is produced on all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers.'1
Grey literature has also been broadly defined to include everything except peer-reviewed books and journals... It has not been published in a conventional way, and can be difficult to identify and obtain through the usual routes, and for this reason it is known as 'grey literature.' http://www.healthknowledge.org.uk/public-health-textbook/research-methods/1a-epidemiology/grey-literature

Recent, new scientific knowledge (i.e. state-of-the-art scientific insights/findings) while important for many NKS is not as important as making sure that knowledge is relevant and able to be operationalised. There is also a question of the ease with which the non specialist can penetrate the disciplinary jargon that of necessity characterises peer reviewed literature.

151109: Use conferences on hands on involvement to keep up to date on science, policy and practice. There is a 2 way dialogue between them and stakeholder organisation dialogue (eg Dairy UK will talk to AHDB Dairy sector directly).

151112B keep up to date by having strong links with the research community in Wales, e.g. by having academic members of stakeholder groups when policy is being developed. The academic community are comfortable challenging their position.

151118: has links with Academia to keep up to date with relevant cutting edge knowledge

151124: is more interested in applied knowledge, so tends to interact with practitioners in established contaminated land regimes practice such as the UK

State-of-the art scientific research can help shape the formulation of policies. However there is a time lag between new knowledge being created, applied and becoming mainstream. While used to be estimated at taking about a decade, it can happen much quicker. The increasing use of open access publication is helping but the great increase in publication outlets and papers is not.

151104: Good use is made of both peer reviewed literature and by close links with researcher and practitioner thought leaders in relevant areas.

151118: Policy lags science and is driven by evidence of good practice (S&W policy on Waste – increase food recycling and reduce landfilling; carrier bag policy); elsewhere could do better.

18.4.2 Possibilities to set the agenda

The ability to influence setting of scientific research policies and agendas has grown in recent years as a result of systematic changes put in place by the major research funders. The use of idea generation and topic prioritisation events such as sandpits[58] has become almost routine when trying to establish research priorities for a funder.

To broaden the base of those undertaking research, town meetings are used to inform interested researchers on the aims of a call for research, specific rules and general advice on what should and should not be included in proposals.

151104: We set national policy which is informed by emerging research. We partner with research funders and researchers. We appreciate early involvement in research project formulation. We offer support in staff time, data and letters of support to many researchers. We sit on research council (RC) committees.

151112B: We have influence in RCUK funding In Wales, and contribute directly through joint funding. Senior staff represent the organisation on programme steering or project advisory boards.

151112B:evidence showed that our nature based Peatland restoration policy was cost effective in helping combat climate change. Ministers (in ca 2014) felt the evidence was sufficiently strong to restore Welsh peatlands by 2020 and the policy was rapidly implemented.

More recently we been looking at fungal DNA assessments in soil samples to assess how habitats have been damaged by agricultural activities. This work is in its infancy and may possibly be extended to using plant DNA to assist in impact assessment and hence feed into mitigation policy measures..

In general NSK felt their needs were reflected in national research agendas however there is a gap between the research produced and the ability of end users to adopt that knowledge in many cases.

[58] EPSRC defines sandpits as: “residential interactive workshops over five days involving 20-30 participants; the director, a team of expert mentors, and a number of independent stakeholders. Sandpits have a highly multidisciplinary mix of participants, some active researchers and others potential users of research outcomes, to drive lateral thinking and radical approaches to address research challenges... Sandpits are intensive discussion forums where free thinking is encouraged to delve into the problems on the agenda to uncover innovative solutions. https://www.epsrc.ac.uk/funding/howtoapply/routes/network/ideas/whatisasandpit/

18.4.3 Science – policy – practice

The UK has a strategic approach to governance that is becoming increasingly cross-sectoral. HM Treasury (2015) reported "The government will publish a new long-term National Infrastructure Plan for the key economic infrastructure sectors – transport, energy, flood defences, water, waste, communications and science." Priority is focused on those areas must critical to national well being. For example a country as rich in surface and ground water resources as the UK merits a single reference by HM Treasury to water whereas energy merits 31 mentions.

NKS appreciate the role of science in informing policy and in policy driving the need for new knowledge. An increasingly strategic approach is being adopted by the major research funders. A wide breadth of topics is funded by individual research councils (e.g. Figure 2).

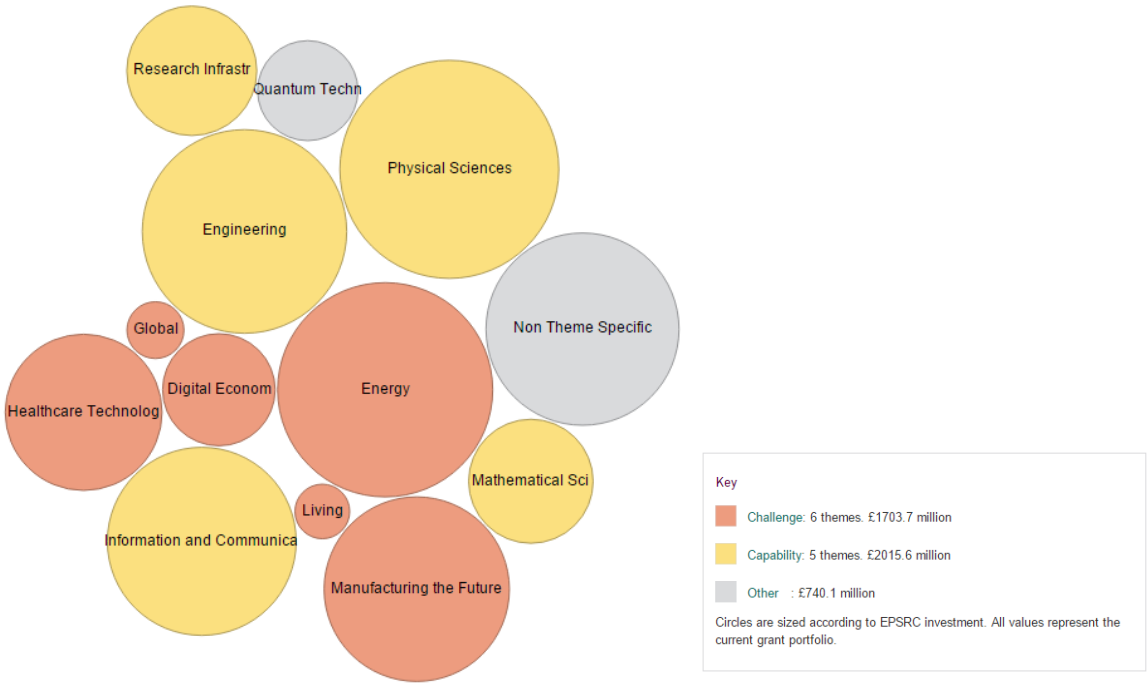

Figure 2: EPSRC Research portfolio (https://www.epsrc.ac.uk/research/ourportfolio/vop/)

151109 carries out a wide range of dissemination and abstraction in order to achieve specific goals. For example, 151109 produced an assessment of the impacts of loss of the use of endocrine disrupting chemicals to the industry, the findings of which were relayed to stakeholders, DEFRA and the EC. This was successful because they were in a position to bring together an agriculture-wide impact assessment. It was a challenge to interpret the findings for several different, including non-specialist, audiences. Some findings however will only be of interest to relatively few stakeholders.

151104: is involved in formulating research questions, knowledge creation and feeding research findings in policymaking. The view was expressed that a range of views is welcome in these processes but ultimately a decision needs to be made in the knowledge that not all stakeholders will be satisfied on every occasion.

The societal impact of scientific research related to the scope of INSPIRATION is increasingly needing to be assessed in the UK. This in part reflects a greater desire from HM Treasury for a deeper understanding of the benefits research funding brings about. Impact is also a key indicator that is used to judge the quality of research by universities during the four yearly research excellence framework process. Some third sector funders however actively seek to fund 'risky' and even blues skies research where the outcome is not necessarily obvious nor its achievement entirely predictable.

151104: Certain issues such as energy and climate change are high on the political agenda, along with food quality and diet. We already have in place good natural resource protection measures. We are putting in place Natural Capital auditing and exploitation mechanisms that will foster its stewardship. However, the interface between the natural sciences, economics and governance could usefully be better understood.

151112A: the last Research Programme 2011 did not have enough evaluation mechanisms were built in. Slightly different approach adopted now, Performance Management Framework in terms of a Logic Model Process (input – outputs – outcomes – long term impacts – can be a long way down the line). Pathways to impact should be built in up front. Learning what other funding organisations are implementing (as long as these are not too onerous).

151112B: no formal mechanism, but up-front the project has to be justified.

151118: 'sporadically' and perhaps unavoidably so. We could look at uptake of findings into the sector. Universities are not incentivized to do that (beyond use of IP).

Several Science-Policy-Interface documents were recommended by NKS or identified during the literature review stage:

151109: Defra's Food and farming plan is currently being drafted[59], H2020, Ireland's Agri food strategy (Republic of Ireland 2015).

151104: the emerging Defra 25 year environment plan[60] and the National Planning Policy Framework (CLG 2012).

1511218: FORESIGHT reports – eg *future of food* (Beddington);

[59] https://www.gov.uk/government/news/great-british-food-and-farming-plan-events-held-across-the-country

[60] A recent update was provided on 23 February 2016: http://www.ciwm-journal.co.uk/defra-to-publish-25-year-environment-plan/

18.5 National and transnational funding schemes

18.5.1 Funding schemes and possibilities for research funding

The UK has a long history of funding pure and applied research in the soil-sediment-water nexus and its relationship with land use and land management. Funders include public, private and third sector organsiations. Collaborative funding is being increasingly seen as attractive despite the associated added bureaucracy. Organisational remits may preclude funding research in a cross disciplinary topic and collaboration can help bridge any such barriers. Collaboration is seen as leveraging third party funds. Colaboration is seen as an indicator that the research is of interest and therefore worth funding.

Table 1 R&I funding options collated for country: UNITED KINGDOM

R&I funding options collated for country:			UNITED KINGDOM	
	Name*	**Research and Innovation funder****	**What and/or whom do they fund?*****	**More info********
Regional				
1	SNIFFER (formerly Scotland and Northern Ireland Forum for Environmental Research)	Funder and knowledge transfer	Sniffer delivers knowledge-based solutions to resilience andsustainability issues in Scotland	www.sniffer.org.uk
2	Agriculture and Horticulture Development Board (AHDB)	Statutory levy body	We are a statutory levy board, funded by farmers, growers and others in the supply chain. Our purpose is to equip levy payers with independent, evidence-based information and tools to grow, become more competitive and sustainable.	http://www.ahdb.org.uk/
3	Regional charities	Various	There are many regional funds for research or knowledge transfer within specific parts of the UK.	Various
4	Trade associations	Various	Trade associations, whose members are predominantly companies rather than individuals, commission research on topics of relevance to their members.	Various.
5	Professional bodies	Various	Professional bodies commisison topical research on matters of interest to their members.	Various

National				
1	Research Councils UK	Umbrella body for all research councils	The primary role of Research Councils UK (RCUK) is to fund research. Each year a total of around £3 billion is invested in research conducted at UK universities, Research Council Institutes, and in securing access to international facilities for UK researchers. This money is used to fund the very best world-class research as judged by independent, expert peer review.	www.rcuk.ac.uk
2	Natural Environment Research Council (NERC)	Research council	NERC funds world-leading basic, strategic and applied research, survey and long-term environmental observation and monitoring of the whole Earth system.	www.nerc.ac.uk
3	Economic and Social Research Council (ESRC)	Research council	We fund research across a wide range of social science topics.	esrc.ac.uk
4	Engineering and Physical Sciences Research Council (EPSRC)	Research council	EPSRC supports excellent, long term research and high quality postgraduate training in order to contribute to the economic competitiveness of the UK and the quality of life of its people.	epsrc.ac.uk
5	Biological and Biosciences Research Council (BBSRC)	Research council	We fund world-class bioscience research that helps to tackle major challenges such as the impact of climate change, a healthier old age, and sustainable food production, land use and energy production.	bbsrc.ac.uk
6	Arts and Humanities Research Council (AHRC)	Research Council	The AHRC seeks to promote and support high quality arts and humanities research through a variety of funding opportunities across its schemes from postgraduate studentships to large scale collaborative research grants, specialist training schemes to strategic programmes, fellowships to research networking.	http://www.ahrc.ac.uk/
7	Leverhulme Trust	Charity	The Leverhulme Trust was established at the wish of William Hesketh Lever and makes awards for the support of research and education. The Trust emphasises individuals and encompasses all subject areas.	https://www.leverhulme.ac.uk/

8	CIRIA	Charity	Working with our members and the wider industry, our varied programme of research projects encourage industry collaboration and help improve the quality, efficiency, cost effectiveness and safety of the modern built environment.	http://www.ciria.org/
9	Innovate UK	Government innovation fund allocation. Co-funds innovation projects with public and orivate sector partners.	Innovate UK is the UK's innovation agency	www.innovateuk.gov.uk
10	Government Departments	Central Government and other emanations of the state	Individual departments commission researchor contribute to collaborative research funding programmes or projects. The activities of individual bodies are accessible through the pull down menu at the URL on the right.	https://www.gov.uk/government/policies/research-and-development

There was no barrier or reluctance to engage in collaborative funding with other organisations, including from other EU MS or beyond where there were clear synergies and no conflicts with for example national security issues or strategic interests. This was a reassuring finding and should help in the final stages of INSPIRATION.

*151109 has no barriers to co-funding in EU or elsewhere. These can be bilateral or multilateral. For example they work with Danish partners on pork production, with French, Belgians and Dutch on potato blight and with Aus/NZ/CAN voluntary contribution programme (VC) co-funding of a programme in UK and other partners led by AUS.*151104: Central government funding of research is limited and will increasingly focus on co-funded activities to leverage the benefit of available funds. 151104 has co-funded European projects, including Interreg.

151112A: have scope to collaborate on funding for work aligned with their goals.

151118: Working *with businesses is effective… use advisory committees to help dissemination. 'Bigger issues' (inc MNC) that are solutions that can be 'exported' or trialled in multiple EU countries is useful (and EU funded).*

160126a,b,c reported a mix of funding schemes including curiosity driven bottom-up and thematic top down funding. The 'world changing' impact of funded research and evidence of the value of the research outcomes is becoming increasingly important when deciding which proposals to fund. A more strategic approach to funding costly research infra-structure has been implemented in recent decades. In this way while infra-structure, including high cost analytical equipment, may be located at one institution researchers from all eligible institutions can apply to use the facilities. In a way the Large Hadron Collider[61] represents the extreme example of how such co-funding can work across many countries.

Increasing the added value of different financial resources (i.e. achieve a multiplier) was seen as a key positive for co-funding. The key was to make the additional administrative burden as light and fast as possible to ensure the maximum resource is allocated to research activities rather than in running the co-funding process.

151104: Early involvement of policy makers can ensure both a better targeted research proposal and maximise the magnitude of support that can be mobilised. Late or last minute approaches cannot be so well supported. Given the growing importance of impact, letters of support are given, often to competing proposals, on a non-exclusive basis to demonstrate end user interest in the potential research findings. Responses to direct approaches for financial support are however subject to strict single tender action constraints in place for the public sector.

151112A: was involved in an ERA NET called Urban NET, stakeholders were more interested in what they wanted to change rather than new knowledge they needed. But ultimately wasn't able to take it forward as there wasn't a policy dept. interested in the (Urban) field.

151112B: there are two or 3 projects such as INTERREG being scoped out, and are becoming increasingly active, there are no real barriers to European collaboration.

[61] http://www.stfc.ac.uk/research/particle-physics-and-particle-astrophysics/particle-physics/lhc-large-hadron-collider-resource-portal/

Currently try to match and leverage funding from other funders such as NERC.

151124: Rather see money going into research in to pragmatic training, techniques, rather than high tech remediation techniques. training in pragmatic decisions : dissemination, knowledge transfer.

There is no single way on how to best set up / govern funding option(s), so that societal demands will be fulfilled, knowledge resulting from execution of the SRA will be taken up and used; and funders experience that their invested, national Euros are indeed multiplied?

Recent thematic calls have been used to support both targeted and urgent research.

18.5.2 Gaps in financial resources for research

The following areas of research and innovation (R&I) that are not (yet) covered by current funding mechanisms and which would benefit from new/different funding schemes / infrastructures were identified by NKS.

151109: Crop rotation aspects of production, though is being address, needs on-going input – how to integrate farming and distribution to improve business efficiency; then scale out to how land is used for farming… how do we use land for multiple purposes…

151104: The challenge is the increasing scope of research activities and the decreasing funding for it. Current funding mechanisms are changing. Increasingly 151104 expects industry to fund or at least substantially co fund research activities.

151112B: there has been a gap in the assessment of soil biodiversity, though NERC is beginning to address this. There used to be a UK soils forum to share information on what was being funded, though that closed ~5years ago.

151118: Embedding systems thinking intonew sectors – eg sust intensification (reducing farm waste); 4th ind rev into agri & food (robotics and automation)… linking projects are missing. Getting out of compartmentalised thinking.

Ways of funding traditionally challenging integrated approaches to address particular societal challenges related to the use and management of land and related impacts to SSW systems were identified by NKS.

151109: Bid preparation is time consuming so needs to be prioritized. Supporting others proposals into RCUK (eg BBSRC) in terms of research or KT activities needs careful thought of what will be achieved/delivered by this engagement. There needs to be clear evaluation procedures and transparent mapping on to the call criteria. Consistent decision making is needed. Peer reviewers (not involved in the original call) need to be well briefed on the call intentions.

151104: Proposals need to justify the societal, environmental and economic benefits/ value of their work.

151104: The UK has a long track record of building policy on research based evidence and on funding research projects to support the implementation of such policy. This work has been published and is now freely available online.

The outcomes need to be robust (including being published in peer review journals), widely accessible (eg through open access publishing) and widely understandable (non-technical and short summaries of the main findings are essential if they are to be taken on board by non-specialists and if they are to change opinions or inform policy formulation).

151112A: better metrics of impact are needed.

151112B: interdisciplinary work is a challenge, but is being addressed more and more. And is important in the face of shrinking budgets.

18.6 Other remarks made by interviewees

Additional remarks of particular note included:

151109: Bio controls; soil loss; nutrient efficiency.

In terms of rotational contexts: We need to know what a healthy soil is and how to get there; eg SOM content is only one part of it. This is an immensely challenging question. We need to know what is going on at sub soil level. National databases and soil maps/ reference collections need to be more widely used by growers and practitioners (need to take them out the research community) – could help practitioners.

151104: There is a willingness to cooperate, including through joint funding, on research with partners outside the UK where there are overlapping interests.

151112A*:* Soils – an area of science which Scotland has much to offer and collaboration would be welcome.

151112B there's a small, strong soils community which knows each other, and to an extent throughout the UK.

151118: "we take soil for granted and we shouldn't and mustn't" soil as water and air as a resource; exploiting natural capital in soil, not preserving let alone enhancing it.

18.7 Annexes

Annex Ia: NKS interviews in the UK

Date of interview	Organisation	Interview	funder	end user	knowledge provider	Nat.reg.loc. authority	Univ./ research inst	SME /consultant	business & industry	NGO	network	Other	soil	sediment	water	land use-management
09/11/2015	AHDB	Mike Storey	1		1							1	1			1
29/10/2015	TCPA	Katy Lock		1						1						1
04/11/2015	DEFRA	Judith Stewart	1		1	1							1	1	1	1
04/11/2015	DEFRA	Maggie Charnley	1		1	1							1	1	1	1
12/11/2015	Scottish Body	Anon	1		1	1							1	1	1	1
12/11/2015	Welsh Govt	Jame Skates	1		1	1							1	1	1	1
12/11/2015	Welsh Govt	Ian Rugg	1		1	1							1	1	1	1
24/11/2015	Irish Practitioner	Kevin Motherway		1	1	1		(1)			1		1	1	1	1
18/11/2015	WRAP	Richard Swannell	1							1			1	1	1	
26/01/16a	EPSRC	Roger Singleton	1									1	1	1	1	1
26/01/16b	NERC	Simon Kerley	1									1	1	1	1	1
26/01/16c	BBSRC	Brian Harris	1									1	1	1	1	1
26/01/16d	ESRC	Hannah Collins	1									1	1	1	1	1
19/11/15a	Environment Agency	Danielle Ashton		1	1	1								1	1	
19/11/15b	Environment Agency	Ian Martin		1	1	1								1	1	
19/11/15c	Landscape Institute	Merrick Denton-Thompson		1						1						1
19/11/15d	National Farmers Union	Martin Rogers		1					1			1	1			1

Annex Ib: NKS questionnaire template

See Chapter 1, Annex I

Annex Ib: NKS hand-out: INSPIRATION interview at a glance

See Chapter 1, Annex II

Annex II: Documents used for the UK desk study

BBSRC. 2013. The age of bioscience: Strategic plan. http://www.bbsrc.ac.uk/documents/strategic-plan-pdf/

Cabinet Office. 2010. Strategic Framework and Policy Statement on Improving the Resilience of Critical Infrastructure to Disruption from Natural Hazards. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/62504/strategic-framework.pdf

Cabinet Office. 2015. National Risk Register of Civil Emergencies 2015 edition. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/419549/20150331_2015-NRR-WA_Final.pdf

CLG. 2012. National Planning Policy Framework. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf (a consultation proposing changes to this closed on Monday 22 February 2016[62]).

EPSRC. 2015. Strategic Plan 2015. https://www.epsrc.ac.uk/newsevents/pubs/strategic-plan-2015/

EPSRC. 2016. Research. https://www.epsrc.ac.uk/research/

ESRC. 2015. Strategic plan - 2015. http://www.esrc.ac.uk/files/news-events-and-publications/publications/corporate-publications/strategic-plan/esrc-strategic-plan-2015/

HM Government. 2011. The Natural Choice: securing the value of nature (White Paper). https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228842/8082.pdf

HM Treasury. 2015. Fixing the foundations: Creating a more prosperous nation. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/443898/Productivity_Plan_web.pdf

Natural England. 2014. An Approach to Landscape Character Assessment. Author: Christine Tudor. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/396192/landscape-character-assessment.pdf

NERC. 2013. The business of the environment: Our strategic direction. http://www.nerc.ac.uk/latest/publications/strategycorporate/strategy/the-business-of-the-environment/

POST. 2011. Natural Capital Accounting. Parliamentary Office of Science and Technology. Note 376. http://www.parliament.uk/documents/post/postpn_376-natural-capital-accounting.pdf

[62] https://www.gov.uk/government/consultations/national-planning-policy-consultation-on-proposed-changes

Republic of Ireland Department of Agriculture, Food and the Marine . 2015. AGRI-FOOD STRATEGY 2025 Strategic Environmental Assessment Draft Environmental Report. https://www.agriculture.gov.ie/media/migration/agri-foodindustry/foodwise2025/environmentalanalysis/AgriFoodStrategy2025SEADRAFT300615.pdf

Scotch Whisky Association. 2015. The Economic Impact of Scotch Whisky Production in the UK. http://www.scotch-whisky.org.uk/media/70581/economic_impact_web.pdf

WRAP. 2015. Food futures: from business as usual to business unusual. http://www.wrap.org.uk/sites/files/wrap/Food_Futures_%20report_0.pdf and online at http://www.wrap.org.uk/content/food-futures

Annex III: List of key societal challenges and related questions as mentioned in the interviews (See Section 2.2 for further details)

United Kingdom

UK-1 efficiency of primary producers, while recognising the associated environmental and societal needs. – Of interest to all in the supply chain. How does improving supply chain efficiency affect the pressure on land use (e.g. by ensuring more, good quality produce reaches the ultimate consumer?)

UK-2 Soil and groundwater remediation is difficult to achieve so best to preserve what we already have.

UK-3 Soil 'Regeneration' – how to increase to Soil Organic Matter in poorer soils, and what level is achievable, desirable, beneficial? Etc. Best practice, costs/benefits in peatland restoration – are there international lessons to learn?

UK-4 Natural systems:A better understanding of how natural systems behave and what processes are operating is needed to understand better the effects of different courses of action. How does soil quality affect the wider system (and vice versa) What are the economic implications of soil degradation, and what evidence and indicators should be used to quantify degradation?

UK-5 Demand for soil/land resources, imports and exports: (the international dimension of food supply and hence food security is important. Need a better understanding of the whole life cycle of food production, transport, consumption and waste to discern the balance between domestic, import and export.

UK-6 Competition between land-uses (land-use conflicts): It is recognised that there are competing and often mutually excluding land uses. How should land use conflicts be resolved? E.g. Is it more appropriate to build on poor quality agricultural soils rather than brownfield land? What instruments are needed to avoid / minimise impacts (feedback to decision-making process). Spatial analysis of distribution and level of Natural Capital to inform decision making. Techniques and technologies to assess (productivity) and value land resources.

UK-7 Targeting outputs: practical, pragmatic effort needs to be expended in targeting outputs to relevant end-users and in linking the fundamental science through to policy and (improving) regulation

UK-8 Competition between land uses (land-use conflicts) : The effects of loss of high quality agricultural land to other land uses, e.g. forestation and to development. There appears to be a lack of research in the UK. There is no research quantification of loss of good quality agricultural land to development.

UK-9 Important areas of technical innovation include new techniques to understand the microbiology of soil to help assess biodiversity and so understanding impacts and optimisation of land management.

UK-10 Landscape scale solution – improve biodiversity and soil management and productivity; funding farmers has modest/ limited impact; LANDSCAPE: WRAP Food futures report. Integration to manage a landscape not the media and not just maximise crop. The role of Precision Agriculture in the improvement/conservation of soil quality – new techniques and technologies to assess/map. Catchment-scale management involving collaboration of individual farmers.

UK-11 assessing the values of primary and secondary production: for example, a high value secondary producer may rely on a relatively low value primary producer, e.g Scottish Barley for Scotch Whisky,

UK-12 Farming practices create valuable (enjoyed) environments – eg uplands and grouse shooting, sheep grazing and patchwork of fields and river margins in the low lands are very dependant on how farmers perceive themselves as guardians to their environment.

Long-time horizons often matter in agriculture – succession from generation to generation is important in some cases, whereas businesses renting land brings about shorter time horizons. Business (land rental over a series of say 3-5 year sequences) and land owning (estate management) objectives need to be managed. How does each of these elements value the other, and how should they value it?

Republic of Ireland

IR-1 (Generic) Risk Assessment of Contaminated Soils. Management of contaminated land varies across Europe. Research is needed to transfer basic tools and processes into an Irish context, eg geology, population, demographics etc from the UK and other EU countries.

IR-2 Pragmatic appraisal of environmental technologies in an Irish setting: there is inertia in the application of technologies such as remediation methods and investigation techniques in Ireland, either because people are unwilling to try ‘new’ techniques, or try new techniques that are wholly inappropriate – eg for the problematic drift geology in much of Ireland. Pragmatic appraisals of the capabilities and limitations of technologies would help better application.

Annex IVa: Agenda of National Workshop held on 8 & 9 July 2015 at the University of Nottingham

8th July	11:00	Registration
	11:30-13:00	Introduction to INSPIRATION; feedback on ACS, GSW & Policy workshops
	13:00-14:00	Lunch
	14:00-15:30	SRA: Soil and Land Use Research - state of the art in the UK
	15:30 - 17:00	SRA: Future Research Needs
	19:30	Dinner
9th July	09:00-10:30	SRA: UK research capacity and capability
	10:30 - 12:00	Research: Policy Interface - experience and suggestions
	12:00-13:00	Lunch
	13.00 – 14.00	Funding Mechanisms: Current Future, Innovation
	14:00 - 14:30	Implementation

Annex IVb: Summary of INSPIRATION displayed as posters during the UK workshop

Figure 2 Title Slide

Figure 3 Objectives of Call

Figure 4 Objectives of Call continued

Figure 5 Expected products and impacts

Figure 6 Expected products and impacts continued

Figure 7 Key challenges

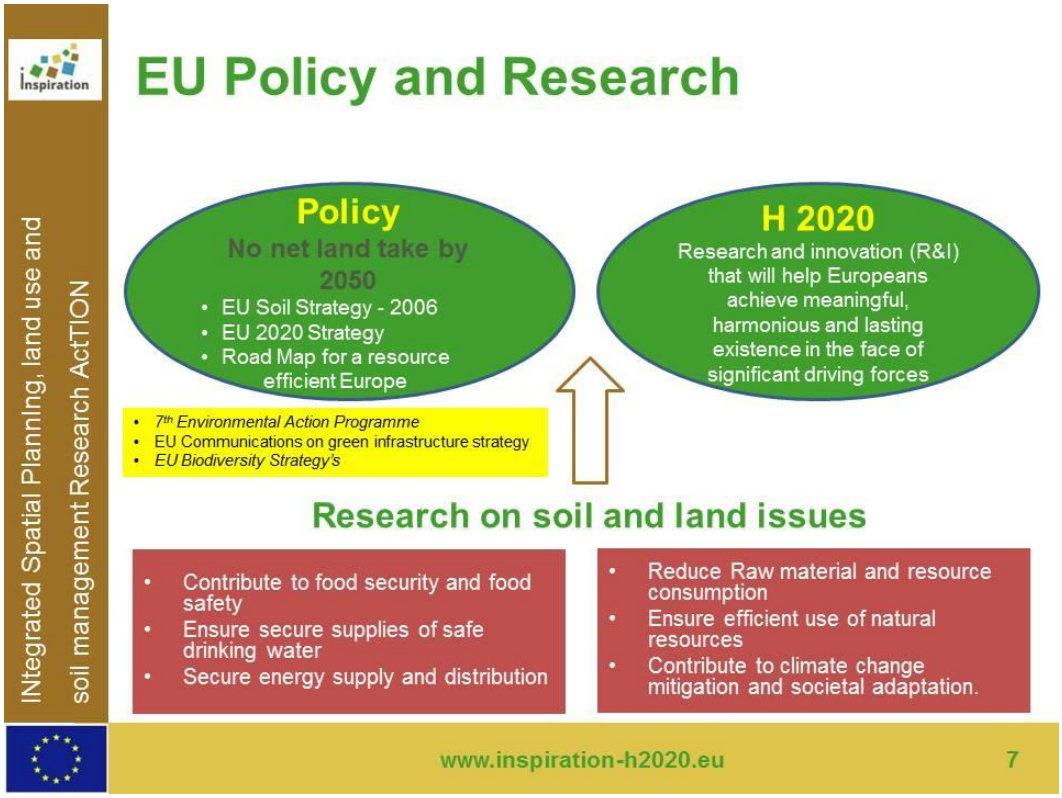

Figure 8 EU policy and research

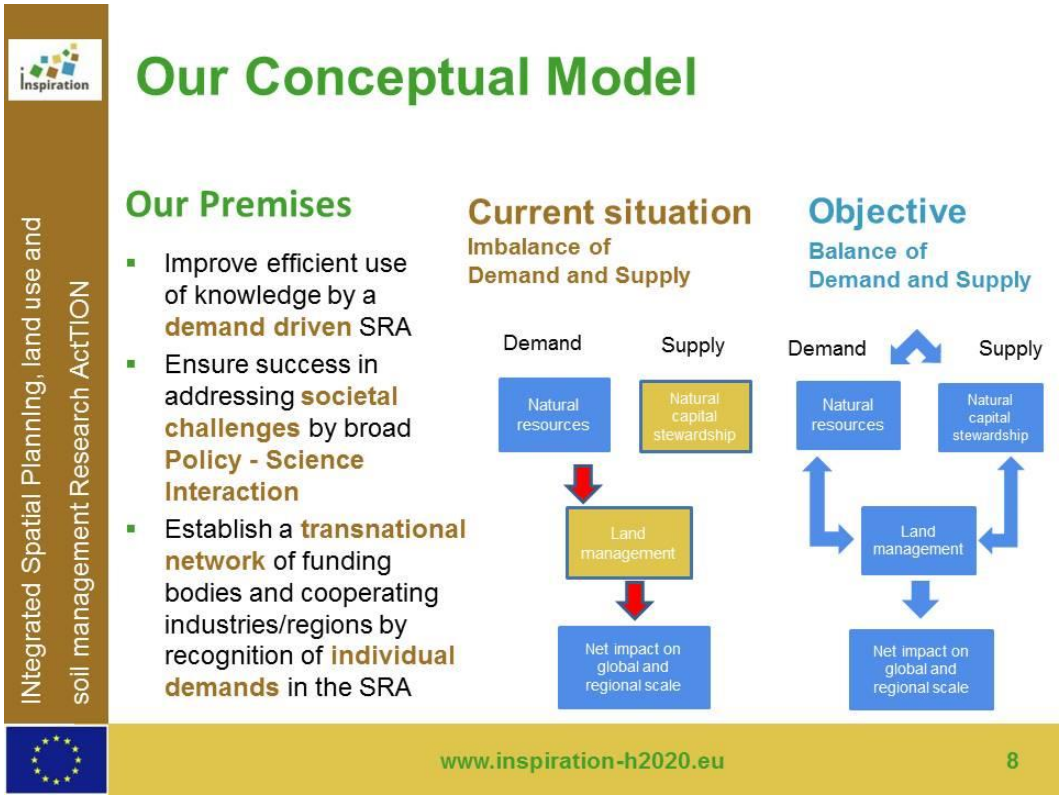

Figure 9 Our conceptual model: Premises

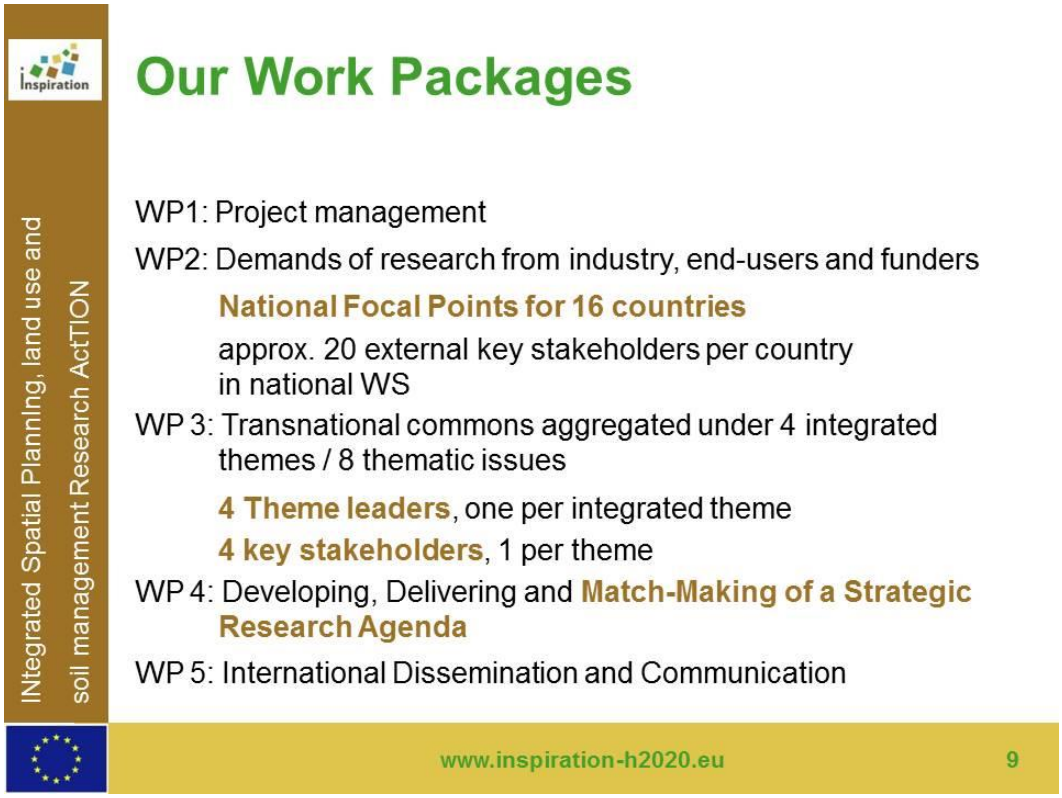

Figure 10 Our work packages

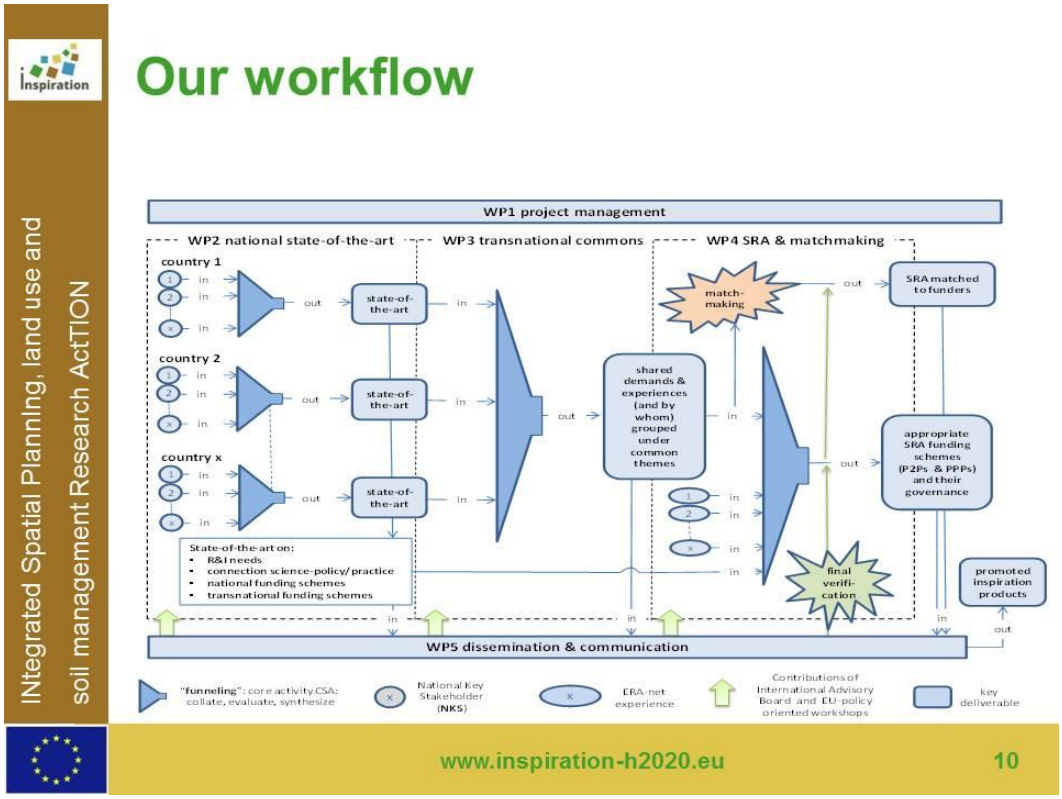

Figure 11 Our workflow

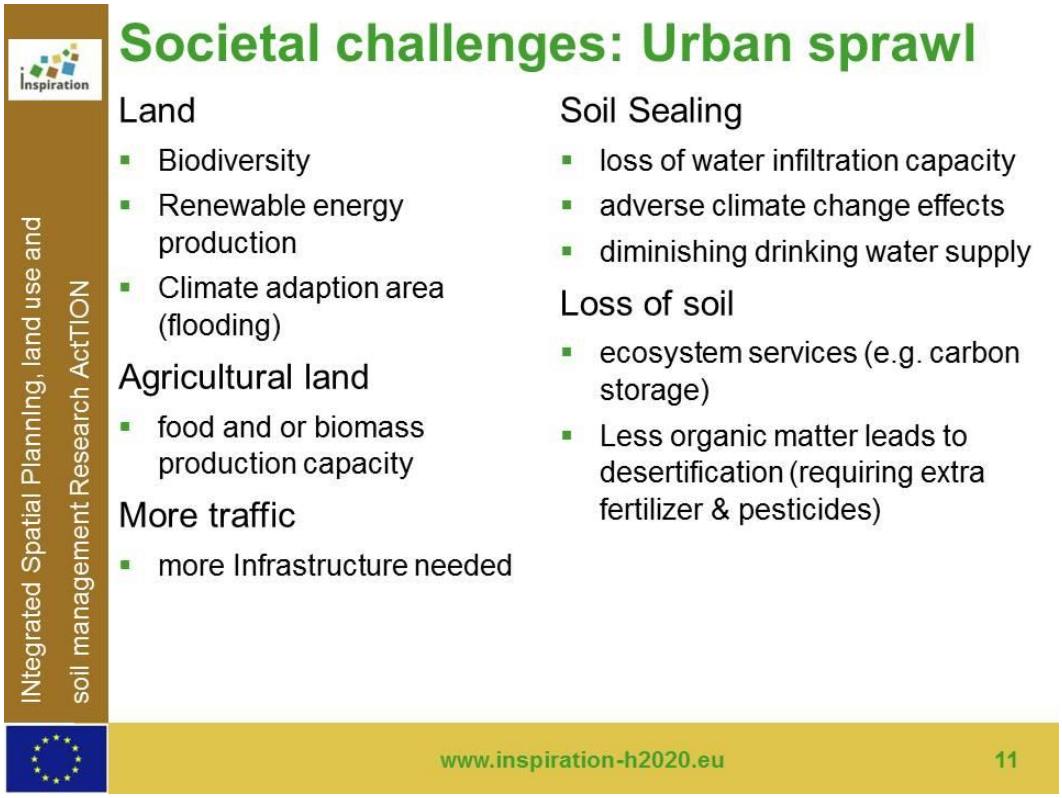

Figure 12 Societal challenges: Urban Sprawl

Figure 13 Baseline

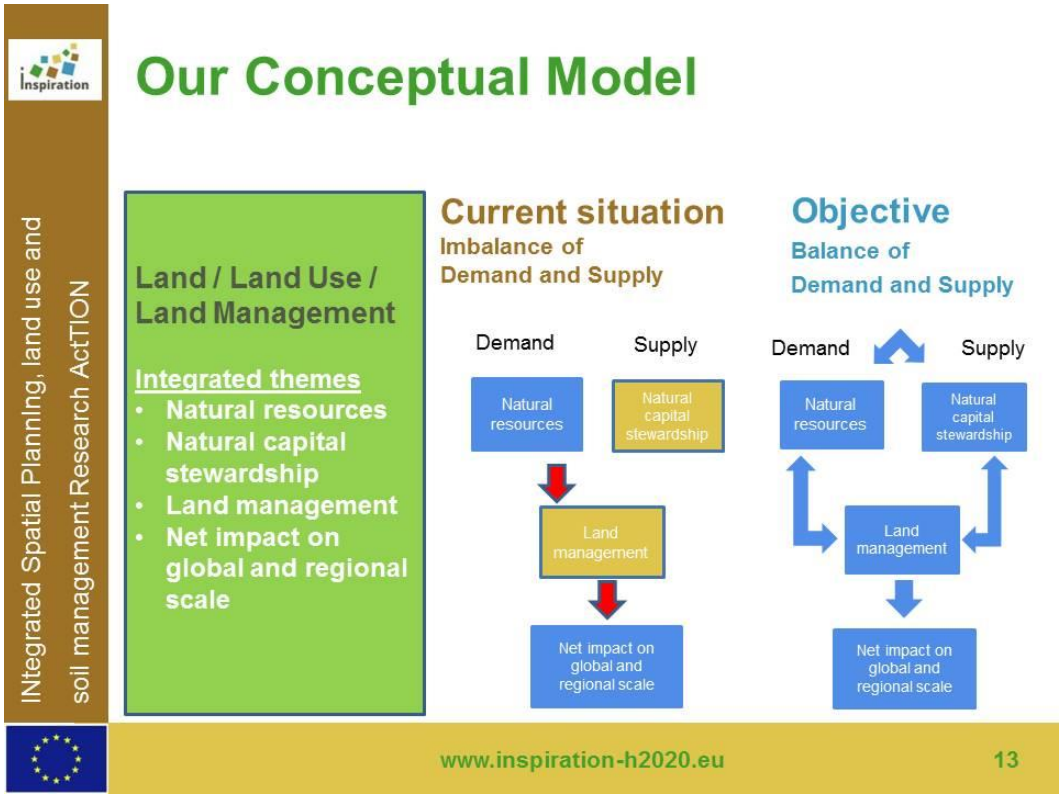

Figure 14 Our conceptual model Integrated Themes

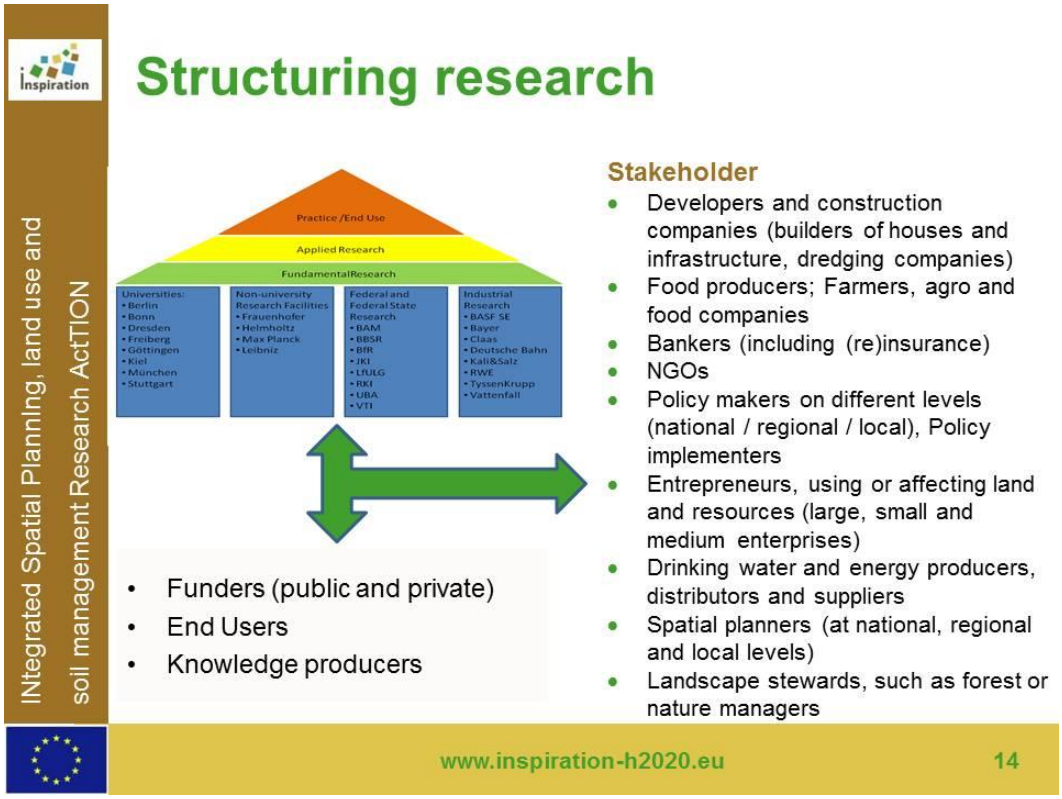

Figure 15 Structuring research

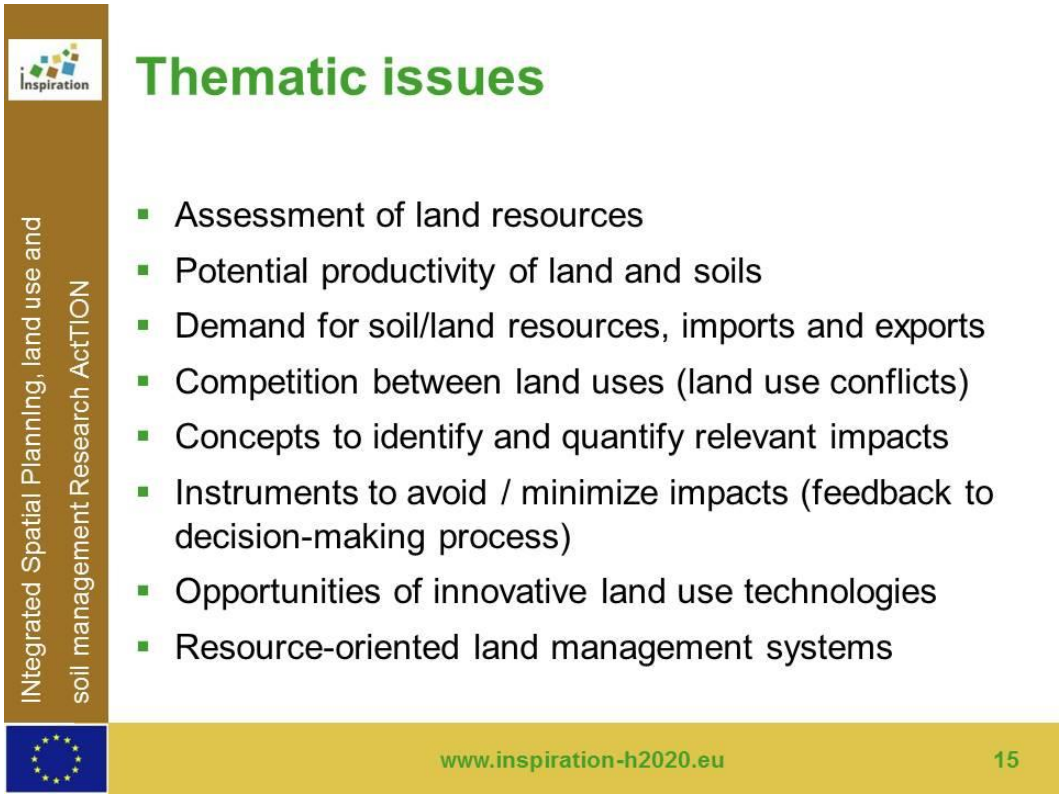

Figure 16 Thematic issues

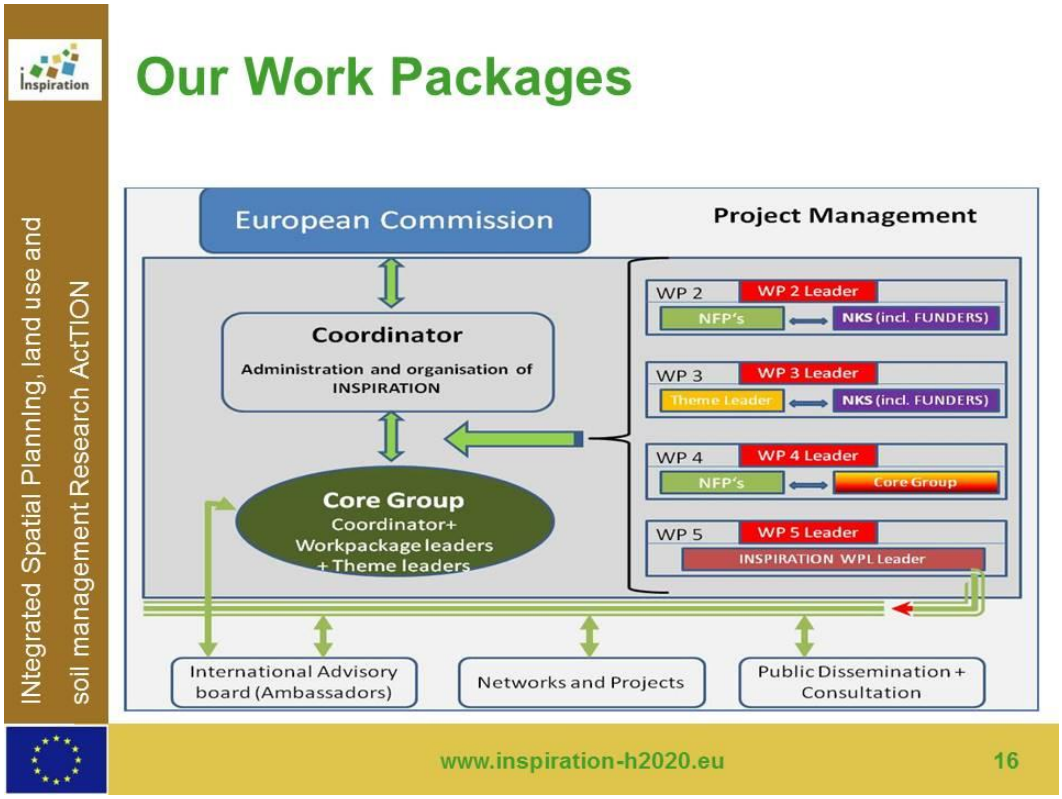

Figure 17 Workpackage linkages

Annex IVc Delegates at the National Workshop

Name	Organisation	Country	Nature
Pól Ó Seasnáin,	Ireland EPA	Ireland	Regulator
Danielle Ashton	EA	UK	Regulator
Michael Williams	Landmark Information	UK	End user
Rob Sweeny	CL:AIRE	UK	Researcher
Rob Howells	NFU	UK	End user
Stephen Austin	Bramcote Community Association	UK	End user/ citizen
Richard Boyle	HCA	UK	End user
Euan Hall	Land Trust	UK	End user
Andy Moffat	BLRS	UK	Reearcher
Matt Ashmore	University of Nottingham	UK	Researcher
Paul Nathanail	University of Nottingham	UK	Researcher

The names of those invited but were unable to attend or declined to attend are not listed above. Some of the invitees were interviewed as National Key Stakeholders.

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