Germany calculates the exceedance for Europe

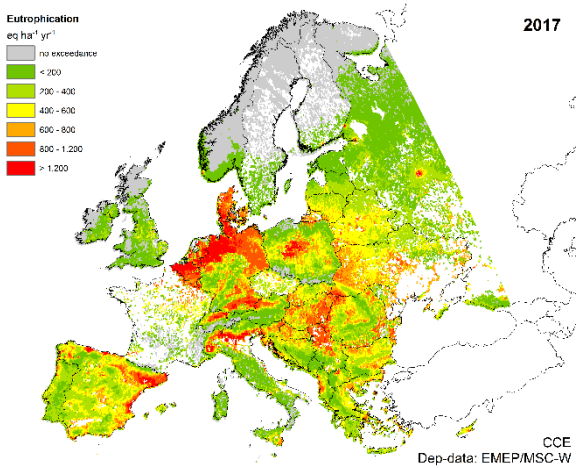
In 2018 Germany took over a central role at the interface between the science-based decision-making and policy-related work under the Convention on Long-Range Transboundary Air Pollution upon establishment of the Coordination Centre for Effects (CCE) at the Federal Environment Agency in 2018.

The CCE is the European programme centre for the modelling and mapping of critical loads. It cooperates closely with the national programme centres of the participating countries. A central task is the management of national critical load data. Based on these data, the CCE calculates the critical load exceedance for the European regions of the Convention.

The information compiled by the CCE and prepared as maps enables the Convention to develop spatially differentiated air pollution control strategies and at the same time verify whether the reduction measures adopted are having a positive impact.

Figure 2

Exceedance of critical loads for eutrophication by nitrogen deposition in Europe in 2017



Source: Coordination Centre for Effects 2019

Are critical loads relevant for policy-making?

The exceedance of critical loads is a measure to determine whether current political regulations and actions are sufficient to protect the environment from harmful effects of air pollutants. The pollution of ecosystems was one of the reasons for updating the legally-binding regulations on air pollution control in Europe, e.g. the Directive 2016/2284 on national emission ceilings for certain atmospheric pollutants (NEC Directive) adopted in 2016.

At the national level, critical loads are incorporated into emission control and nature conservation measures in order to assess to what extent nitrogen deposition would negatively affect sensitive ecosystems. In addition, critical load exceedance is the basis for determining the indicator "Eutrophication of Ecosystems" in the National Sustainability Strategy of 2017.

Further information
Critical Loads & CCE: www.umweltbundesamt.de/en/cce
Convention: www.unece.org/env/lrtap/welcome

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Critical Loads
for terrestrial ecosystems

Für Mensch & Umwelt

Umwelt Bundesamt

Air pollution knows no borders

Air should contain as few pollutants as possible because air pollution poses a major health risk and leads to numerous environmental problems. Pollutants are transported over long distances in the atmosphere and can therefore cause damage far from their source.

To reduce transboundary air pollution international cooperation is needed. One example is the Convention on Long-Range Transboundary Air Pollution, which was established 40 years ago and now covers 50 mostly European countries as well as the USA, Canada and countries in the Middle East.

The threat to ecosystems and biological diversity caused by excessive inputs of nutrients from the air is a central theme of the Convention. For example, excessive inputs of nitrogen and sulphur to sensitive ecosystems lead to changes in structure and function. As a result, species can be displaced. Trees and other plants can become more susceptible to further stress factors such as drought or disease.

Glossary

- **Deposition -** is the flux of air pollutants. They are introduced into ecosystems in rain and snow, as gases and as particles.
- **Eutrophication -** is an excess of nutrients in ecosystems caused by human activities.
- **Ecosystem -** is a relationship between living organisms (biocoenosis) and a habitat (biotope).
- **Acidification -** means that the pH value of a system (e.g. soil or water) decreases. This can be caused by deposition of sulphur and nitrogen compounds.

What are critical loads?

Critical loads are an important scientific instrument of the Convention on Air Pollution Control for risk assessment of ecosystems. They are a measure for assessing the sensitivity of ecosystems. Critical loads are a quantitative estimate of an exposure to one or more pollutants at levels below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge.

A protected good (also called "receptor") can be an entire ecosystem or any part thereof, for example individual plant species. In Germany, critical loads are primarily derived for acidification and eutrophication of forests and other semi-natural terrestrial ecosystems.

How are critical loads and their exceedance derived?

There are two different approaches for assessing critical loads. The empirical approach is based on visible effects. The results of field studies and expert knowledge are used to assign thresholds for pollutant inputs to a specific ecological receptor. Using the simple mass balance approach, maximum input limits are modelled. In so doing, all processes in an ecosystem that lead to the harmless binding, storage or leaching of a potential pollutant are determined and described. The sum of the substances bound in these processes then forms the maximum input limit below which no damage to the ecosystem will occur.

Critical loads are compared with the actual deposition of atmospheric pollutants in order to determine whether the critical loads have been exceeded. In regions with exceedance, measures to reduce pollution are necessary.

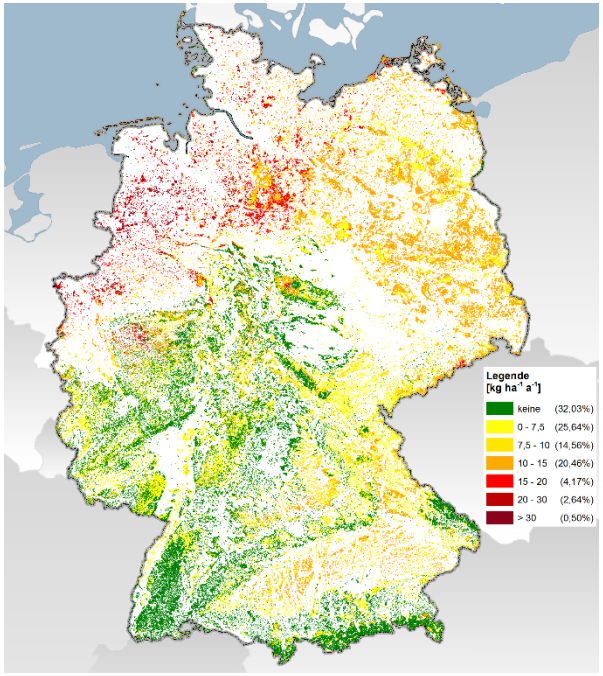
Are critical loads exceeded in Germany?

In 2015 critical loads for *acidification* were exceeded in Germany on 26% of the ecosystem area under consideration. In 2000, the proportion was 57%. The decrease in area with exceedance is due to the reduction in emissions as a result of air pollution control measures.

In 2015 the critical loads for eutrophication were exceeded on 68% of the areas. In 2000, the proportion was 79%. The map shows that many areas in northern and eastern Germany in particular are threatened by eutrophication.

Figure 1

Exceedance of critical loads for eutrophication by nitrogen deposition in Germany in 2015



Source: German Environment Agency 2018