European critical loads: database, biodiversity and ecosystems at risk

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Publiekssamenvatting

Europese kritische waarden: database, biodiversiteit en gevoelige ecosystemen. Slotrapport van het CCE 2017

Met dit rapport sluit Nederland zijn rol als trekker van de taken van het Coordination Centre for Effects (CCE) af. Het CCE heeft tot eind 2017 de taak om het Europese luchtbeleid te ondersteunen met informatie over risico's van effecten van te veel zwavel en stikstof op Europese natuurgebieden. Het CCE helpt deze vraag te beantwoorden door modellen te ontwikkelen en een Europese database te beheren waarmee risicogrenzen ('kritische belastingsgrenzen') van deze stoffen per type natuurgebied worden bepaald.

Twaalf EU-landen, plus Zwitserland en Noorwegen, rapporteren over het gebruik van deze methoden en leverden hiervoor informatie. Voor de overige Europese landen heeft het CCE met Alterra een database ontwikkeld zodat de limieten voor het gehele continent berekend kunnen worden. De database is ook gebruikt om wetenschappelijke instellingen uit het CCE-netwerk van de landen die deze taak hebben, te trainen (National Focal Centre). Over de CCE-resultaten bestaat consensus binnen de VN-conventie over luchtkwaliteit (die jaarlijks de CCE-resultaten evalueert) en de EU, zodat over de wetenschappelijke basis voor het Europese luchtbeleid, tot eind 2017, geen misverstand bestaat.

CCE-data worden onder andere gebruikt om alternatieven voor luchtbeleid door rekenen. Recentelijk zijn ze ingezet om de Europese Richtlijn voor nationale emissieplafonds te herzien. Met de berekeningen worden de oorzaken, kosten en gevolgen van luchtverontreiniging voor de biodiversiteit en de bodem doorgerekend. Hieruit blijkt dat circa 79 procent van de natuurgebieden (Natura 2000-gebieden) in de 28 Europese landen in 2020 aan te veel stikstof blootstaat.

Dit jaar is voor het eerst voor heel Europa in kaart gebracht of specifieke plantensoorten het risico lopen om door te veel stikstof of verzuring te verdwijnen. De methoden en data die hiervoor zijn gebruikt, worden vooralsnog voor wetenschappelijke doelstellingen ingezet; voor beleidsondersteuning moeten ze nog worden aangevuld en verbeterd.

Dit op biodiversiteitsverlies gerichte werk kan voor meer doelen worden gebruikt. Bijvoorbeeld om beleidsmaatregelen te helpen vinden om natuurlijke eigenschappen die belangrijk zijn voor de veerkracht van de natuur, te beschermen tegen luchtverontreiniging en andere milieurisico's, waaronder klimaatverandering.

Het RIVM heeft namens Nederland de CCE-rol sinds 1990 uitgevoerd voor de Conventie voor Grootschalige Grensoverschrijdende Luchtverontreiniging van de Verenigde Naties (LRTAP-Conventie). Een ander Europees land zal de rol vanaf 2019 overnemen.

Kernwoorden: biodiversiteit, CCE, ecosystemen, kritische depositieniveaus, luchtverontreiniging, natuurbescherming, overschrijding

Summary

European critical loads: database, biodiversity and ecosystems at risk

With this Final Report 2017 the Coordination Centre for Effects (CCE) located at the National Institute for Public Health and the Environment (RIVM, Bilthoven, the Netherlands) is concluding its work. In 1990, tasks of the CCE were offered by the Netherlands to the Convention on Long-range Transboundary Air Pollution (LRTAP Convention) of the United Nations Economic Commission for Europe (UNECE). The LRTAP Convention then adopted the CCE as programme centre of the "International Cooperative Programme for the Modelling and Mapping of Critical Loads and Levels and Air Pollution Effects, Risks and Trends" (ICP M&M) under its Working Group on Effects.

The main task of the CCE includes the development of methodologies and databases enabling the assessment of thresholds ("critical loads") for the protection of ecosystems against adverse effects of atmospheric pollutants, with an emphasis on acid and nitrogen depositions. For this task, the CCE collaborates with a European network of National Focal Centres of the ICP M&M. In this context, the CCE is regularly requested by the Convention to issue calls for data to these centres. The CCE is finally responsible for the compilation of national information on critical loads into a European database. The European critical loads database is then used in the Greenhouse Gas Interactions and Synergy Model (GAINS) held by the Centre for Integrated Assessment Modelling of the LRTAP Convention (located at IIASA, Austria) in support of European air pollution abatement policies.

In this report, latest results of the CCE are described (Part 1) with special attention for the consolidation of information in a manner that is tailored for use by the - at the time of writing this report not yet identified - successor of the CCE. Part 2 contains detailed accounts of the work conducted by National Focal Centres over the past two years.

Chapter 2 focuses on the call for critical loads data 2015-2017. A novel element consisted of requesting National Focal Centres to include methods to compile critical loads for biodiversity, i.e. thresholds of acid and nitrogen deposition below which the loss of specific plant species does not occur according to present knowledge. Consensus on these methods had been achieved under the ICP M&M during a number of preparatory meetings and workshops prior to the 2015-2017 call for data. In addition to these novel critical loads, also data were requested to enable an update of the European critical loads database that had been used in support of LRTAP Convention protocols and the National Emission Ceilings Directive of the European Union.

Fourteen Parties to the Convention, i.e. twelve EU Member States plus Switzerland and Norway, submitted critical loads of nitrogen and of sulphur, including seven Parties that also submitted critical loads for biodiversity. It is noted that that the data required for the assessment of

critical loads for biodiversity need to be further completed to include more NFC submissions and more nature types. In view of this, a possible improvement of the modelling of relationships between the probability of occurrence of plant species and abiotic conditions is described in Chapter 4.

For countries that do not submit data, the CCE developed over the years a so-called European background database, described in Chapter 3, in collaboration with Alterra (the Netherlands). The use of this database enables computed critical loads for acidity, nitrogen and biodiversity to cover ecosystems in the whole of Europe. Thus, critical loads are available for European ecosystems categorized according to the European Nature Information System of the EEA, covering an area between two and three million km2.

The updated European database on critical loads, has then been used for the analysis of effects of air pollution abatement alternatives (Chapter 1) to illustrate results of the application of the database in the GAINS model. It turns out that a simulation of abatement policies embedded in the so-called Current Legislation pathway leads to a reduction of the ecosystem areas being at risk of excessive nitrogen deposition from 67 % in 2005 to about 58 % of in 2020. For the EU28 these percentages are 81 % and 71 % respectively. When acidification is used as endpoint a reduction from 11 to 4 percent of areas at risk can be noted between these years.
In addition, the impact of climate change on critical loads and exceedances is included in Chapter 1 to illustrate the potential capability of methodologies to assess interactions with effects of air pollution as expressed in the long-term strategy of the Convention.

Finally, it is recommended that knowledge of effects of interactions between air pollution and climate change be further strengthened by improving critical loads of biodiversity. This could include various interactions that affect the health of ecosystems, such as between temperature, drought, ozone, nitrogen and aerosol exposure. These assessments could help support multi-effect oriented policies that are jointly framed under UN-Conventions and EU strategies for air pollution, climate and biodiversity.

The successor of the Coordination Centre for Effects is encouraged to continue the coordination and programming of this scientific challenge in collaboration with other effect-based programmes under the LRTAP Convention.

Keywords: air pollution, biodiversity, CCE, critical loads, ecosystem, exceedance, impacts.

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