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Mapping and modelling critical loads for nutrient nitrogen in French Natura 2000 sites

Arnaud Mansat, Sophie Leguédois, Anne-Christine Le Gall, Anne Probst

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Communication

Informations

- Auteurs : Mansat A, Leguédois S, Le Gall A-C, Probst A
- Titre : Mapping and modelling critical loads for nutrient nitrogen in French Natura 2000 sites

Résumé

Atmospheric deposition of nitrogen has significant impacts (vegetation changes, nutrient imbalances...) on natural and semi-natural ecosystems. The Natura 2000 network consists of (semi-)natural sites chosen to ensure long term survival of European most valuable and threatened habitats and species. It is thus necessary to assess the sensitivity to nitrogen deposition of these nature conservation sites.

Under the long-range transboundary air pollution convention, the impact of nitrogen deposition on ecosystems has already been assessed at a national scale with critical load modelling. Thus the purpose of this study is to model and map critical load of nitrogen for the French terrestrial Natura 2000 network.

Critical load, i.e. the maximum deposition “below which significant harmful effects on specified sensitive elements of the environment do not occur” was assessed using two approaches. The first approach, called empirical critical load, is based on measured changes in the structure and functions of ecosystems. We used published data on empirical critical loads and compiled for different ecosystems described in the European Nature Information System, i.e. Eunis (Manual on methodologies and criteria for modelling and mapping critical loads & levels and air pollution effects, risk and trends, Umweltbundesamt, 2004). The second approach (Simple Mass Balance, SMB) is model-based. It uses mass balance equations to compute the steady state input and output fluxes of nitrogen for the soil compartment. These two approaches have been adapted to the French terrestrial ecosystems in previous works, however the mapped areas do not match the Natura 2000 sites.

Critical loads for nutrient nitrogen were determined for SACs (Special Areas of Conservation) under the Natura 2000 habitat directive. To adapt the empirical and the steady state approaches to terrestrial SACs, we used expertise as well as information available on soil type, climate. For empirical critical loads, we first linked the 86 terrestrial ecosystems (Habitat Annex I classification)

present in French SACs to the Eunis (Moss and Davies, Cross-references between the Eunis habitat classification and habitats included on Annex I of the Habitats Directive 2002). Critical load values were then adjusted with expert judgement according to available information (Manual on methodologies and criteria for modelling and mapping critical loads & levels and air pollution effects, risk and trends, Umweltbundesamt, 2004) extracted from spatial databases

In order to synthesise the information and produce a map at the site level, an aggregation method has been developed. This method is based on the “precautionary principle”, and it assumes that only the lowest critical load value is kept for each site. Finally, results were compared to nitrogen deposition (European Monitoring and Evaluation Programme — Emep — data).

One of the difficulties in modelling empirical critical loads of nitrogen for Natura 2000 sites is the use of the Eunis to express empirical critical loads. This classification is not equivalent to the Natura 2000 classification. The translation from literature data to the Eunis and then from the Eunis to Natura 2000 classification induces uncertainties. For a wider use of this method on Natura 2000 network, it would be useful to compile the published data on empirical critical loads in the framework of the Natura 2000 classification.

Poster

Voir page suivante.