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ÉCLAIRE

Effects of Climate Change on Air Pollution Impacts and Response Strategies for European Ecosystems

Seventh Framework Programme

Theme: Environment

D15.3 The VSD+-PROPS (FKA EUMOVE) model linked to European databases

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Dissemination Level		
PU	Public	☐
PP	Restricted to other programme participants (including the Commission Services)	☐
RE	Restricted to a group specified by the consortium (including the Commission Services)	☐
CO	Confidential, only for members of the consortium (including the Commission Services)	☐

1. Executive Summary

This deliverable describes the linkage between the model VSD+-PROPS to assess the probability of plant species occurrence on a European scale and European-wide data bases on soils, vegetation and climate. Data bases for soil (based on the 1:1M European Soil data Base from JRC), vegetation (based on the Land Use Map of RIVM-CCE) and climate (Eclaire climate data base) where developed on a 0.01×0.01° resolution for Europe and linked to VSD+-PROPS.

With this model, probabilities for plant communities based on simulated soil pH and nitrate (computed by the VSD+ soil model) and ECLAIRE scenario data for temperature and precipitation can be assessed. Results of the regional model can be used to assess biodiversity indices for forests, grasslands and heathlands in Europe. These results can subsequently be used in WP16 to compute climate dependent critical nitrogen thresholds, based on criteria for impacts on plant species diversity.

2. Objectives:

This deliverable relates to: Objective 15.3. The VSD+-EUMOVE (and MADOC-EUMOVE) models linked to European databases.

3. Activities:

This deliverable provides the linkage between the model VSD+-PROPS to assess the probability of plant species occurrence on a European scale and European-wide data bases on soils, vegetation and climate. New data bases for soil (based on the 1:1M European Soil data Base from JRC), vegetation (based on the Land Use Map of RIVM-CCE combining Corine land use data with detailed data for non-EU countries), climate (Eclaire climate data base) and Natura 2000 areas where developed on a 0.01×0.01° resolution for Europe and linked to VSD+PROPS. Combining these data, about 2 M computational units were created that form the bases of a regional assessment of the Soil Vegetation Model VSD+-Props. Furthermore, a data set was created that provides a list of typical species per vegetation type that can be linked to the vegetation map.

In addition, a review has been made of biodiversity indicators and a thorough overview of the possibilities and preferences is described in Van Dobben et al (2014). It is concluded that a so-called habitat quality index, based on lists of wanted ('positive') and unwanted ('negative') indicator species for a given habitat, whose probabilities to be present are predicted by a niche model such as PROPS, is the most promising index for critical load calculations. The newly developed indicators for biodiversity were tested on a site scale (Gómez Mateus, 2014) .

4. Milestones achieved:

The VSD+PROPS model is linked to newly created European data bases on soil, vegetation, climate and Natura 2000 areas, including a data base with species per vegetation type being linked to the vegetation map, and is now fully operational for European applications.

With this model, probabilities for plant communities based on simulated soil pH and nitrate (computed by the VSD+ soil model) and ECLAIRE scenario data for temperature and precipitation can be assessed. Results of the regional model can be used to assess biodiversity indices for forests, grasslands and heathlands in Europe. A preliminary assessment of PROPS to Europe using so-called similarity indices, i.e. the Bray-Curtis index and the Simpson index, has been reported (Reinds et al., 2012, De Vries et al., 2014). New simulations are foreseen using the habitat quality index. Results can subsequently be used in WP16 to compute climate dependent critical nitrogen thresholds, based on criteria for impacts on plant species diversity.

5. Deviations and reasons:

Deviations and related reasons are as follows:

- The model EUMOVE has been renamed to PROPS to avoid confusion with a model called ‘EUROMOVE’.
- The MADOC model will be applied to the UK only and consequently, the linkage MADOC-PROPS will not be made. This was decided since application of MADOC-PROPS to Europe would be a too demanding task that does not lead to much new insights. Instead a more detailed application for one country was considered more relevant

6. Publications:

De Vries, W., M. Posch, G.J. Reinds, L.T.C Bonten, J.P. Mol-Dijkstra and J.-P. Hettelingh. (2014). Integrated assessment of impacts of atmospheric deposition and climate change on forest ecosystem services in Europe. In W. de Vries, J.-P. Hettelingh & M. Posch (eds) Critical Loads and Dynamic Risk Assessments: Nitrogen, Acidity and Metals in Terrestrial and Aquatic Ecosystems (in press).

Gómez Mateus, A.M., 2014. Impacts of nitrogen deposition and climate change on plant species diversity. MSc Thesis in Environmental Sciences Supervised by Janet Mol- Dijkstra and Wim de Vries.

Reinds, G.J, , Bonten, L., Mol-Dijkstra, J.P., Wamelink, G.W.W., Goedhart, P., 2012. Combined effects of air pollution and climate change on species diversity in Europe: First assessments with VSD+ linked to vegetation models. In: Maximilian Posch, Jaap Slootweg, Jean-Paul Hettelingh (eds.), CCE Status Report 2012: Modelling and Mapping of Atmospherically-induced Ecosystem Impacts in Europe, Bilthoven, Netherlands, p 49-6.

Van Dobben, H.F., M. Posch, G.W.W. Wamelink, J.-P. Hettelingh and W. de Vries (2014). Plant species diversity indicators for use in the computation of critical loads and dynamic risk assessments. In W. de Vries, J.-P. Hettelingh & M. Posch (eds) Critical Loads and Dynamic Risk Assessments: Nitrogen, Acidity and Metals in Terrestrial and Aquatic Ecosystems (in press).

7. Meetings:

Deliverable was discussed at the First annual Eclaire meeting in October 2013 in Zagreb and presented at the UNECE LRTAP CCE workshop in Rome 2014.