

A-1 Biodiversity in a changing environment: predicting spatio-temporal dynamics of vegetation

Project objectives

Climate change affects vegetation dynamics and vegetation properties. Existing models assume invariable characteristics of vegetation types. This represents a major drawback compared to reality. Therefore the objective of this project is to predict the effects of climate change on vegetation through plant traits.

What are plant traits?

With plant traits, we imply characteristics of plant species that are directly and dynamically related to their adaptations to the environment (Fig. 1). They are therefore predictive and robust.



Figure 1: Two plant species (*Erica tetralix* and *Urtica dioica*) widely varying in leaf size, leaf life span and leaf 'tastiness', reflecting their adaptation to nutrient poor and nutrient rich conditions, respectively.

Approach

Key to the approach is an explicit distinction into two steps. In the first step, plant traits are linked to environmental conditions, including climate change, based on ecological and physiological principles. In the second step, plant traits are linked to smart statistical tools to translate traits into the occurrence probabilities of various vegetation types (Fig. 2). Any classification scheme can be used in the second step, allowing maximum flexibility in response to users' requests.

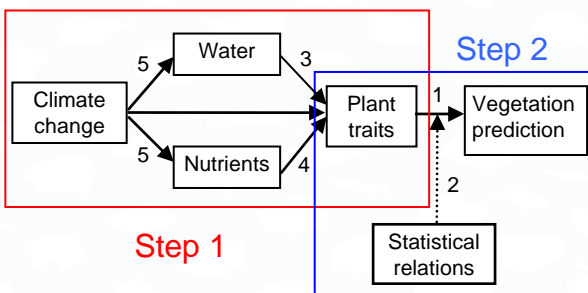


Figure 2: Organisation and approach used in the project. Numbers depict various subprojects (see project plan).

Achievements

Our approach was applied to predict indicator values of the vegetation. Indicator values can be considered as integrative plant traits. Estimated indicator values were used to predict vegetation type occurrences in one of the provinces in the Netherlands (Fig. 3). Predictions closely matched actual occurrences.

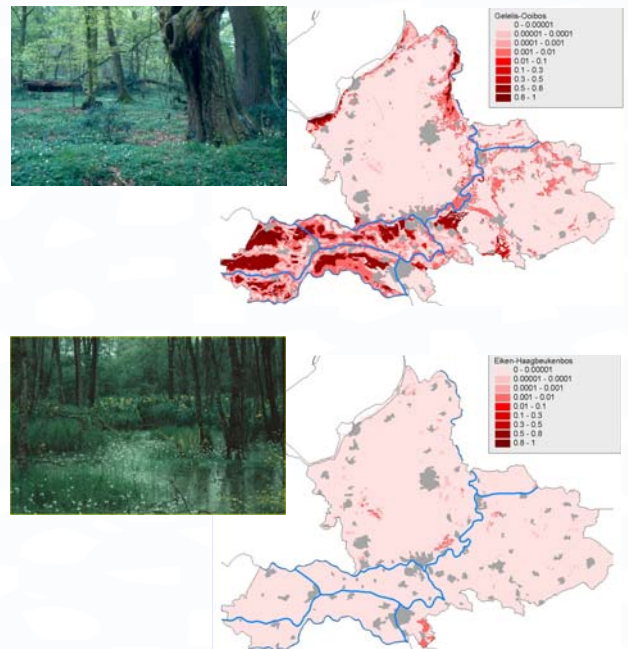


Figure 3: Predictions of vegetation occurrences of two forest types in the province Gelderland of the Netherlands.

Future perspectives

So far, the progress of our project runs according to plan: Our approach was shown to be fruitful at present day conditions.

The next step is to further implement ecological trade-offs in the model and to implement our method into the national ecosystems models of MNP. These models will subsequently be linked to climate change scenarios to be applied directly in policy and spatial planning.

In addition, our approach is already used for nature and water management. In the future, it may also be used to evaluate various mitigation options, for instance to determine whether conservation measures related to the EU Habitat directives are still effective in a changing climate.