1st TERRABITES Symposium
Hamburg, Germany, 9-11 February 2010
TERRABITES-36

Using the assembly theory to make habitat distribution models more applicable in a changing climate.

J.C. Douma (1), J.P.M. Witte (1,2), R.P. Bartholomeus (2), J.C. Ordonez (1), R. Aerts (1), and P.M. van Bodegom (1)

(1) VU University Amsterdam, Institute of Ecological Science, Dept of Systems Ecology, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands, (2) KWR Watercycle Research Institute, P.O. Box 1072, 3430 BB Nieuwegein, The Netherlands

Predicting vegetation distribution in a changing climate requires reliable habitat distribution models (HDM). Current HDMs are often criticized because of the lack of a mechanistic basis, as they empirically fit species distributions to environmental conditions. To include more mechanism in those models, several studies propose to adopt the assembly theory framework. The assembly theory states that species are selected by their traits and that only those species that pass the environment filter can be part of the community. This study tests if and to what extent this framework can give HDMs a more functional basis. This was done by predicting a set of four plant traits (stem density and indicator values for moisture, nutrients and acidity) from their environmental drivers (disturbance, moisture supply, nutrient supply and acidity, respectively). These traits are subsequently used to predict the probability of occurrence for 15 vegetation types, covering the spectrum of vegetation types across the Netherlands. We calibrated and validated this model using 263 plots in the Netherlands. Our results indicate that the inclusion of a causal link between environment and traits goes at the cost of the site specific performance, while model performance was appropriate at a landscape level. Model performance is mainly affected by the degree of uncertainty in the environment-trait relationships and the number of vegetation types distinguished. This study is the first attempt to explicitly use the assembly theory in HDMs which, due to its mechanistic basis, potentially can make HDMs more applicable under future climate conditions.