**Modelling the impact of climate change on natural habitats in Hungary**

PhD thesis abstract
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Ecosystems contribute inconspicuously, yet fundamentally, to human well-being by supplying vital goods and services, including genetic resources, habitat maintenance and climate and runoff regulation. The combined effects of climate change and other global change drivers may impose dramatic impacts on species and ecosystems worldwide, with potentially detrimental consequences on human society. In order to detect and to avoid potential pitfalls, thorough preparation based on sound scientific assessments is needed. In this thesis I present a climate change vulnerability assessment for the natural and semi-natural ecosystems of Hungary, conforming to the recommendations of the IPCC. This required several minor methodological developments, since some features of the IPCC methodology are typically unimplemented in ecological impact studies.

The analysis was based on a vegetation cover database (the Hungarian national vegetation database, MÉTA) providing presence/absence and cover ratio data of 86 semi-natural vegetation (habitat) types on a regular grid with 35 ha resolution covering the entire country of Hungary. *Exposure* to climate change was quantified using six different global climate model outputs comprising four different models and three emission scenarios, which together provide a cross-section of the climatic and socio-economic uncertainties within the projections. To estimate the *sensitivity* of the habitats, six types of climate sensitivity were identified and estimated. Direct climatic impacts were calculated quantitatively with correlative distribution modelling using an ensemble technique, and all other potential impact mechanisms were quantified with the help of experts in a multi-criteria assessment framework. *Capacity* for autonomous *adaptation* was assessed using a novel conceptual framework of landscape ecological indicators. Three potential adaptive capacity indicators were identified, describing (1) the potential resilience of the individual habitat patches, (2) the local refuge-providing ability of the landscape, and (3) the connectivity and permeability of the landscape. The proposed framework was tested with the help of independent field observations, the results of which suggest general applicability of the indicators, even for regions with no high-resolution vegetation cover data.

With the help of the novel approaches presented in this thesis it is possible to extend a typical ecological climate impact study to a more complete vulnerability assessment. I hope that my efforts can lead to more realistic estimations of ecological sensitivity and to an improved integration of natural ecosystems in interdisciplinary vulnerability and adaptation policy assessments.