MODELLING BIODIVERSITY AND SPECIES PERSISTENCE OF DYNAMIC URBAN BROWNFIELD HABITATS UNDER DIFFERENT SPATIO-TEMPORAL CONFIGURATIONS

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Key words: habitat suitability models, dynamic landscape, urban planning, landscape model

Urban brownfields (derelict sites) often support rich communities and considerable portions of the biodiversity of a city. As the locations of brownfield patches shift due to redevelopment and abandonment, they form highly dynamic habitats in space, and, because of continuous changes through the course of succession, in time.

The TEMPO-project evaluates the idea of 'temporary conservation' in urban brownfields. Maintaining the regional species pool of a city requires a mosaic of all successional stages (Strauss and Biedermann, 2006), but in contrast to common practice in traditional nature conservation this mosaic cycle excludes only some areas from development at a time.

We developed a landscape model to analyse the effects of different land use pattern and time schedules for redevelopment on both single species and overall biodiversity of plants and insects. In this model the relationship between soil parameters, successional age, landscape context (the surrounding vegetation and site age structure), and the occurrence of 38 plant and 43 insect species is quantified by habitat models. Additionally, incidence function models (Hanski, 1994) were derived for two grasshopper species (*Oedipoda caerulescens* and *Myrmeleotettix maculatus*) to better understand the role of patch dynamics and spatial configuration on species persistence.

Insect occurrence is mainly driven by landscape context and vegetation structure, whereas plant habitat models are strongly correlated to site age and soil properties. Thus, brownfield allocation and site age distribution (reflecting turnover rate) determine species composition of the study area. For example, down to a certain threshold, biodiversity as well as the occurrence of rare species benefit from smaller mean site size.

Our modelling approach allows for the prediction of changes in community composition if parts of the gradient of brownfield succession are cut off (e.g. due to faster redevelopment), and for comparison of different special arrangements of brownfield sites in the context of urban planning.

References

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