Kennis voor Klimaat

Knowledge for Climate

Green infrastructure as a regional climate change adaptation strategy for dispersal-limited species

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Context of the study

Green Infrastructure has been frequently named as a strategy for making ecological networks robust against climate change. In the CARE Project (**C**limate **A**daptation for **R**ural ar**E**as, part of the Dutch Knowledge for Climate Programme), we seek integral adaptation strategies, to cope with climate change from the perspective of agriculture, water management and biodiversity simultaneously, at a regional level. Green (and blue) infrastructure has the potential to provide multiple benefits in this context. For example, it could provide habitat for species, reduce nutrient runoff from fields, improve natural pest control and increase the water retention capacity of the landscape. However, knowledge gaps exist with respect to the design of green infrastructure (in terms of amount and density for example), to bring these benefits about. In this study we first assess the biodiversity benefits in relation to design criteria for green infrastructure. Using the Great Crested Newt (*Triturus cristatus*) as one of our model species, we ask to what extent green infrastructure improves the capacity of species to cope with effects of climate change (i.e. changing frequencies of critical weather events and spatial shifts in climate suitability).

Research Framework

In collaboration with regional policy makers, we developed multiple landscape scenarios for a case study area in the east of the Netherlands, varying the density and location of green infrastructure (see Fig.). Using a stochastic metapopulation model in combination with a dispersal simulation model, we assess the viability of various types of species in these different landscapes, under three climate scenarios (current climate and two projections of climate change, source: KNMI). The climate effects are explicitly incorporated in the modelling framework, by translating relevant weather events into effects on reproduction or survival based on literature or expert judgement.
The outcomes of this on-going study will be used to design adaptation options for biodiversity conservation for the Baakse Beek region in particular, and for multifunctional landscapes in general. While this study focuses on the biodiversity aspects, in further work these results will be combined with adaptation options for agriculture and water, to design cost-effective adaptation options for multifunctional landscapes.

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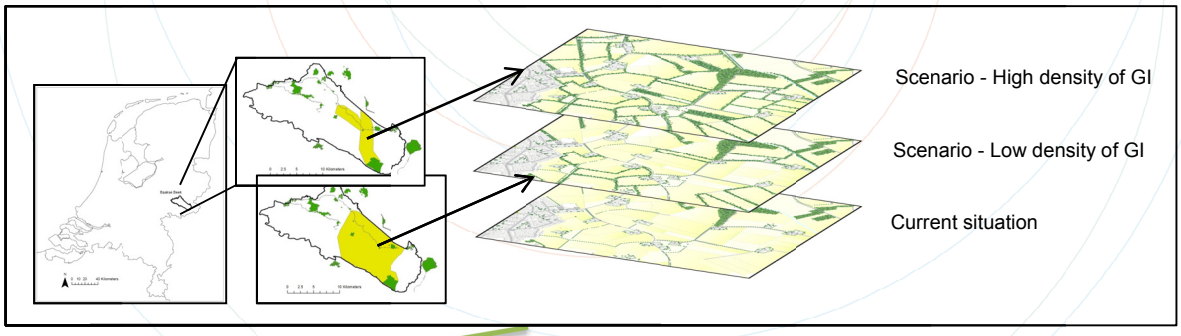

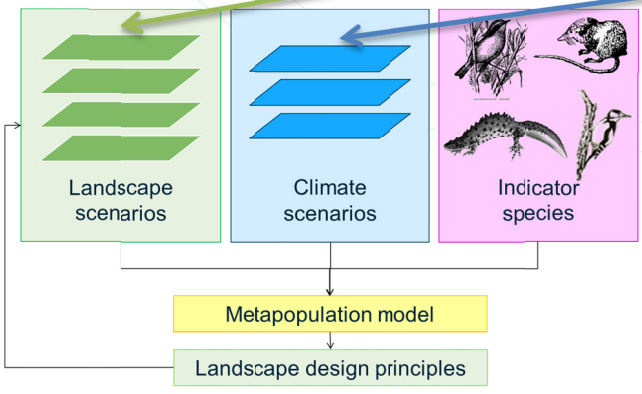

Climate effects on Great crested newt

Frequency depends on Climate scenario (KNMI G and W+)

Event	Effect
Pond desiccation	Reduced recruitment
Mild winters	Reduced reproduction
Severe frost	Reduced survival
Early spring	Increased winter survival probability for new recruits