
Modelling community changes due to nutrient addition in a global network of grassland experiments

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Abstract

Species diversity is undergoing considerable changes in part due to anthropogenic influences such as habitat fragmentation and fertilization. The impact of nutrient addition on plant community composition and its consequences on the provision of ecosystem services has been extensively studied in experimental setups and theoretical frameworks, but generalisations across experiments and natural communities remain challenging. Here we present a spatially explicit resource competition model which allows the independent manipulation of species number and traits (resource requirements), resource distribution and dispersal across a meta-community landscape. It computes the effects of species composition changes on mechanisms driving biodiversity-ecosystem functioning relationships. Since the model structure is almost identical to the setup of a global network of grassland diversity experiments (Nutrient Network), including 30 sites across the globe with data of at least 4 years after nutrient addition we are able to present the comparison of model predictions with actual changes in community composition and productivity due to addition of one or more nutrient(s).

Keywords: biodiversity, ecosystem functioning, meta, community model, nutrient addition, community composition, resource competition, Nutrient Network (NutNet)

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