



Metaweb of interactions between species.

FutureWeb – Climate and land use change threat to the vertebrate European food web structure and functioning

Context

Abrupt climate change and drastic land-use change, along with other human-made disturbances, have already triggered species extinctions, range shifts, and phenological changes. However, up to now research has mostly provided simplified predictions and scenarios that overlook many of the most relevant biological processes in ecological systems and do not report or assess uncertainties. First, most biodiversity models have been heavily criticized because they ignore basic mechanisms, such as biotic interactions and links between trophic levels (e.g. predator-prey). A second, strongly related limitation is that the relationship between multi-trophic assemblages, ecosystem functioning and ecosystem services is poorly understood and modelled. Third, most current studies of biodiversity and ecosystem services focus on a single biodiversity model or one or a few climate scenarios. Finally, the conservation agenda needs a paradigm shift from focusing on species rarity and threat alone to also securing the structure and functioning of food-webs.

Main objectives

FutureWeb will integrate predictive biogeography, geography, biostatistics and trophic web ecology to derive an ensemble of scenarios of the impact of global change on multi-trophic vertebrate biodiversity, ecosystem functioning and the provision of ecosystem services in Europe. Through an effective involvement of relevant stakeholders, the project will adapt methodological choices, scenarios and indicators in such a way that the results are useful for conservation planning and decision-making support.

Main activities

A set of harmonized ecological and environmental data across Europe will be developed, including species distribution data, species trait data and a fully resolved species interaction matrix for all European vertebrates, as well as high resolution climatic and land use layers for both current and future conditions. In parallel, FutureWeb will develop, benchmark and extend novel multi-trophic biodiversity models to larger spatial scales and multi-trophic diversity data. These will be applied to all vertebrate species to project their potential distributions under ensembles of climate and land use scenarios while accounting for their trophic interactions. Using metabolic theory, the project will then integrate measures of multi-trophic ecosystem functioning and services in the ensemble predictions. Finally, it will identify areas that should be conservation priorities by combining the principles of systematic conservation planning with the ensembles of projections of biodiversity projections, multi-trophic functioning and ecosystem services.

FutureWeb will ensure an effective application and uptake of scenarios and models in policy- and decision-making by involving policy makers, practitioners and other relevant stakeholders throughout the entire process of scenario development, selection of relevant biodiversity/ecosystem functioning and services variables, and evaluation of conservation options.

Partners of the project:

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University of Helsinki, FINLAND

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