# Population dynamics on large and complex food webs

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**Abstract**

Food webs are complex ecological networks which, in their simplest case, describe who eats whom in particular ecosystems. One of the big questions in ecology, if not the major one, is what drives this complexity or how species diversity is maintained in such ecosystems. Theoretical ecologists have approached this question by either combining structural food web models with models of population dynamics (top-down framework) or by letting such large and complex food webs evolve from a small number of species by combining population dynamic models with dynamic processes of species extinction, invasion and speciation (bottom-up framework). None of the published approaches within any of these frameworks is currently entirely satisfactory and the question of how to build dynamically stable, large and complex food webs still remains a big challenge.

In this talk I explore, within the top-down framework, how several mechanisms such as disproportionately reduced consumption on rare resources, continuous immigration from a source environment and (intraspecific) interference among consumers, known to stabilize consumer-resource dynamics in small and relatively simple food webs contribute to persistence of large and complex food webs. In addition, I demonstrate how Allee effects in basal and/or non-basal species do affect food web performance. The simulation procedure I adopt is as follows: a food web structure is built using the currently very popular niche model, a population dynamic model is superimposed and run on it for which parameters are randomly generated from specified ranges, and the final food web structure is recorded. Having a stochastic component, the whole procedure is repeated a given number of times. Finally, I will discuss some alternative approaches and methodological issues that concern exploration of population dynamics on large and complex food webs.