Top-down effects of foraging decisions on local, landscape and regional biodiversity of resources (DivGUD)

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Abstract

Foraging by consumers acts as a biotic filtering mechanism for biodiversity at the trophic level of resources. Variation in foraging behaviour have cascading effects on abundance, diversity, and functional trait composition of the community of resource species. Here we propose diversity at giving-up density (DivGUD), when foragers quit exploring a patch, as a novel concept and simple measure to quantify these effects at multiple spatial scales. In experimental landscapes, patch residency of wild rodents decreased local α-DivGUD (via elevated mortality of species with large seeds) and regional γ-DivGUD, while dissimilarity among patches in a landscape (ß-DivGUD) increased. Thus, DivGUD provides a framework linking theories of adaptive foraging behaviour with community ecology allowing to investigate cascading indirect predation effects across multiple trophic levels e.g. the ecology-of-fear framework; feedbacks between functional trait composition of resource species and consumer communities; and effects of inter-individual differences among foragers on the biodiversity of resource communities.

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