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Google matrix analysis of ecological meta-community networks

We model ecological meta-communities, ie, entanglement between foodwebs and landscape patches, as a global nutrient transfer networks analyzed by methods based on the Google matrix. Nutrients can flow from species to another (species predation) or from landscape patch to another (species displacement). We use the PageRank and the CheiRank centrality measures to rank the species by their capabilities to capture and to release nutrients. These rankings can be obtained for each landscape patch or globally for the whole landscape. The PageRank-CheiRank balance will be computed allowing a cross-analysis with the species trophic levels. Our approach provides a new method for the analysis of species interactions embedded in meta-communities. We analyze also the sensitivity of centrality measures, PageRank and CheiRank, to ecological link weight variation induced by ontogenic changes, species diet modifications, or landscape reshaping.