

Plant community dynamics from the perspective of recruitment networks: introducing the Recruitment and Replacement model (R&R).

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Abstract

The study of plant community dynamics has a long tradition. However, this field has barely incorporated the tools developed in the modern study of ecological networks. Key for this incorporation is the availability of a theoretical model able to incorporate field data about plant-plant interactions. In this study I introduce the Recruitment and Replacement (R&R) model that explicitly incorporates empirical networks of plant-plant interactions that occur during recruitment. The R&R model is built on fundamental demographic rates and incorporates competition for space between adults, intra- and inter-specific effects of established plants on recruitment and the colonization of vacant space. The basic analysis of the model provides predictions regarding different aspects of plant community dynamics, like the environmental conditions and species properties under which facilitation of recruitment is more likely to occur, the effect of recruitment facilitation on invasion, the effects of plant-plant interactions on equilibrium abundances and community stability, and the network properties that should relate to species equilibrium abundances. Many of these predictions agree with findings from published meta-analyses, supporting the general validity of the recruitment networks framework as a general approach to integrate the study of plant community dynamics into the study of ecological networks.

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