The function-dominance correlation drives the direction and strength of biodiversity-ecosystem functioning relationships

Michael Crawford[1], Kathryn Barry[1], Adam Clark[1], Caroline Farrior[2], Jessica Hines[3], Emma Ladouceur[1], Jeremy Lichstein[4], Isabelle Marechaux[5], Felix May[6], Björn Reineking[7], Lindsay Turnbull[8], Christian Wirth[1], and Nadja Rüger[1]

[1]German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig
[2]The University of Texas at Austin
[3]German Centre for Integrative Biodiversity Research
[4]University of Florida
[5]Univ Montpellier, CIRAD, CNRS, INRAE, IRD
[6]Freie Universität Berlin
[7]Univ. Grenoble Alpes, INRAE, LESSEM
[8]Oxford University

April 14, 2021

Abstract

Community composition is a primary determinant of how biodiversity change influences ecosystem functioning and, therefore, the relationship between biodiversity and ecosystem functioning (BEF). We examine the consequences of community composition across six structurally realistic plant community models. We find that a positive correlation between species' functioning in monoculture vs. their dominance in mixture with regards to a specific function (the "function-dominance correlation") generates a positive relationship between realized diversity and ecosystem functioning across species richness treatments. However, because realised diversity declines when few species dominate, a positive function-dominance correlation generates a negative relationship between realized diversity and ecosystem functioning within species richness treatments. Removing seed inflow strengthens the link between the function-dominance correlation and BEF relationships across species richness treatments but weakens it within them. These results suggest that changes in species' identities in a local species pool may more strongly affect ecosystem functioning than changes in species richness.

Hosted file

`SimNet_Manuscript_Revision_CLEAN.pdf` available at https://authorea.com/users/407760/articles/517995-the-function-dominance-correlation-drives-the-direction-and-strength-of-biodiversity-ecosystem-functioning-relationships