|  |  |
| --- | --- |
| Dr Peter H. Thrall  Editor-in-Chief  *Ecology Letters* |  |
| **Emanuele Giacomuzzo**  Doctoral student  Phone +41 767908556  Emanuele.Giacomuzzo@uzh.ch |
| Zurich, XX INSERT DATE BEFORE SUBMITTING XX | |
|  | |

Dear Dr Peter H. Thrall,

We have enclosed our manuscript, ‘Ecosystem size mediates the effects of resource flows on biodiversity and ecosystem function at different scales’, to be considered for publication as a Letter article in *Ecology Letters*.

The size of ecosystems and the flow of non-living resources connecting ecosystems are key factors that affect their biodiversity and function. However, the interaction between ecosystem size and resource flows has been largely overlooked. That is, the flow of resources has been commonly assumed to happen between ecosystems of the same size. We, therefore, do not know whether asymmetry in the size of ecosystems modifies the effects that resource flows have on biodiversity and ecosystem function. As natural ecosystems come in different sizes and are connected through the movement of non-living resources (Gounand et al., 2018, Nat. Commun.), assuming connected ecosystems to be the same (symmetric) size may hinder our understanding of how flows of non-living resources drive the biodiversity and ecosystem function of connected ecosystems.

Here, we conducted a protist microcosm experiment to examine how ecosystem size asymmetry affects the biodiversity and function (total biomass) of two-patch meta-ecosystems whose patches were connected through flows of non-living resources. To do this, we mimicked resource flows between ecosystems of asymmetric sizes yet otherwise of identical properties and between ecosystems of the same size. We found **the effects of resource flows were mediated by patch size asymmetry. In particular, meta-ecosystems with asymmetric patch sizes–but not meta-ecosystems with symmetric patch sizes–had higher levels of α-diversity but lower levels of β-diversity and ecosystem function compared to their unconnected counterparts.**

**Our study is a significant contribution to Ecology, as it enhances our understanding of how biodiversity and ecosystem function are driven by a ubiquitous process in nature, namely flows of non-living resources between ecosystems of different sizes.** Our manuscript addresses the critical need to understand what drives ecosystem function (Gonzalez et al. 2020, *Ecol. Lett.*) and biodiversity (Riva & Fahrig 2023, *Ecol. Lett.*) in landscapes comprised of multiple ecosystems. We believe *Ecology Letters* is the perfect platform to share our work, as it has been at the forefront of research on how biodiversity and ecosystem functions are driven by ecosystem size (e.g., Crotty et al., 2018, Drakare et al., 2006, Rybicki & Hanski 2013, *Ecol. Lett.*) and non-living resource flows (e.g., Leroux & Loreau, 2008, Peller et al., 2022, Pichon et al., 2023, *Ecol. Lett.*).

We thank you for considering our manuscript for publication in *Ecology Letters*.

Best regards,

A black background with a black background

Description automatically generated with medium confidenceA close-up of a signature

Description automatically generatedA picture containing shape

Description automatically generatedA close-up of a signature

Description automatically generated

Emanuele Giacomuzzo, Dr Tianna Peller, Dr Isabelle Gounand, and Dr Florian Altermatt