

November 12, 2025

Dear Editors,

We are excited to submit our manuscript, “**Mechanisms behind the facilitation–competition transition along rainfall gradients**” to Nature Communications. Here, we turn the famous Stress Gradient Hypothesis from a verbal idea into a mechanistic resource-based model that links canopy shading and root water redistribution to herb biomass and soil water. To our knowledge, this is the first resource explicit framework that generates the ubiquitous sign reversal along rainfall gradients and, crucially, specifies when it should and should not occur.

We believe our result will be of large interest the broad readership of *Nature Communications*:

- Resolves a live controversy: we show that shading predicts a mid gradient peak in interaction strength, while mechanisms of water redistribution lead to a steady change in interactions from positive to negative
- Moves beyond pattern to mechanism with clear, simple tests that field groups can run: shade manipulations paired with measurements of transpiration and assimilation along gradients.
- Timely and actionable: woody cover is changing through drought mortality, fire, shrub encroachment, and afforestation, while many regions are drying. The framework indicates where shade will help herbs by conserving water and where it will suppress growth because light limits.
- Accessible beyond specialists: minimal equations that map to measurable quantities, figures that show how patterns arise, and plain conditions that readers can test in their own systems.

We are confident that this paper will interest both modelers and empirical researchers; we suggest that referees include experts from both communities.

Suggested reviewers :

- **Santiago Soliveres:** Department of Ecology, Universidad de Alicante, Spain. Email: Santiago.soliveres@ua.es
- **Mara Baudena:** Institute of Atmospheric Sciences and Climate (CNR-ISAC), National Research Council of Italy, Turin, Italy. Email: m.baudena@isac.cnr.it
- **David Ward:** Department of Biological Sciences, Kent State University, USA. Email: dward21@kent.edu
- **Katja Tielbörger:** Institute for Evolution and Ecology, University of Tübingen, Germany. Email: katja.tielboerger@uni-tuebingen.de
- **Thomas Koffel:** Laboratoire de Biométrie et Biologie Évolutive (LBBE), Université Claude Bernard Lyon 1, Villeurbanne, France. Email: thomas.koffel@univ-lyon1.fr

Thank you for your consideration.

Sincerely, Oded Hollander, Yair Mau
& Niv DeMalach