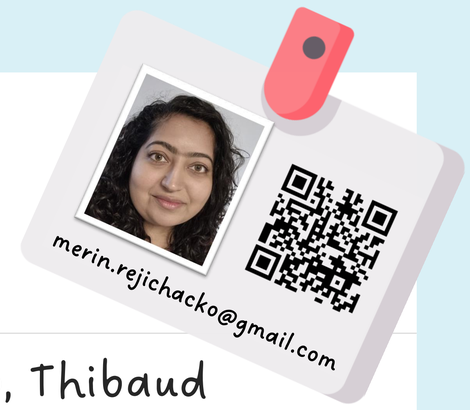
Elevation & land use gradients drive food web structure & trophic connectivity

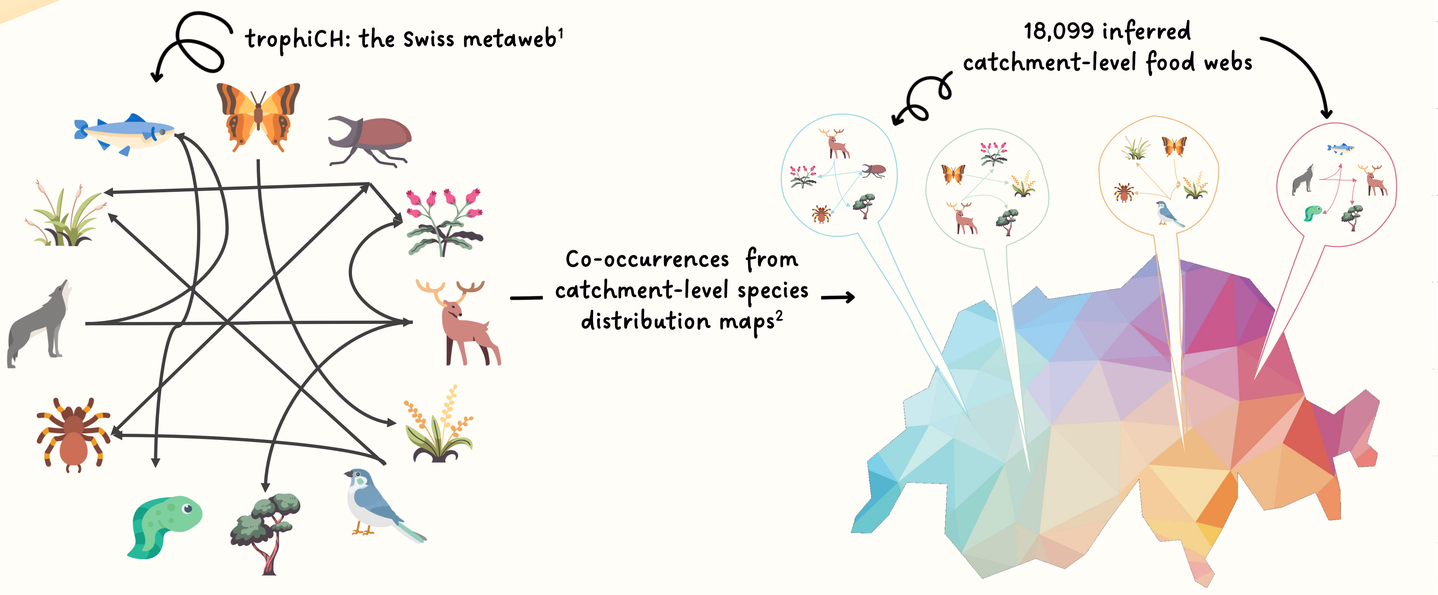


Merin Reji Chacko, Camille Albouy, Florian Altermatt, Ben Christensen, Fabian Fopp, Thibaud Gloaguen, Martin M. Gossner, Hsi-Cheng Ho, Fabio Sigrist, Léa Zucchinetti & Loïc Pellissier

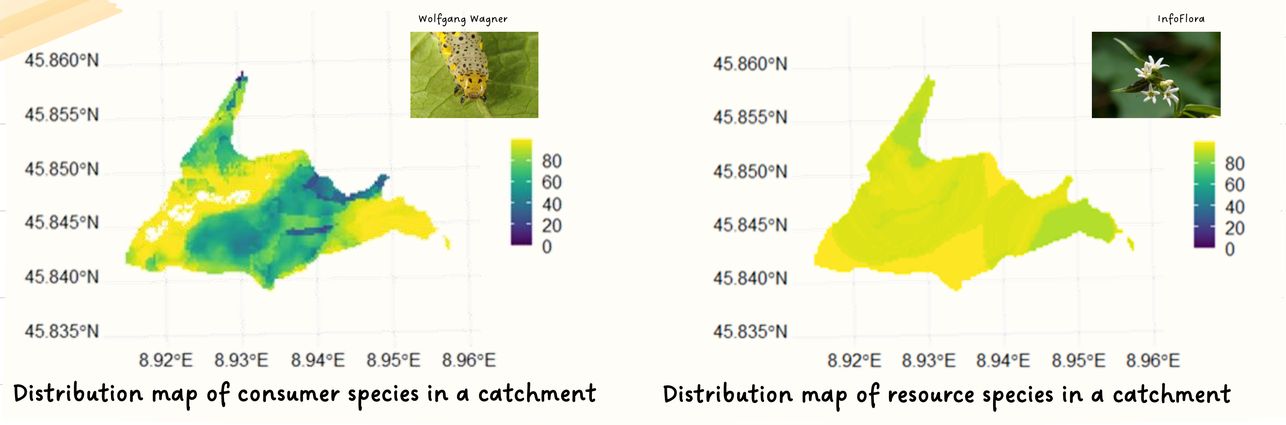
Introduction

- species move in search of food, linking other species & habitats across regions
- regional multi-species connectivity is central for maintaining interactions & ecosystem functions
- **how do environmental gradients drive food web structure?**
- **how do environmental gradients and food web structure drive multi-species connectivity?**

The **metaweb approach** for inferring food webs

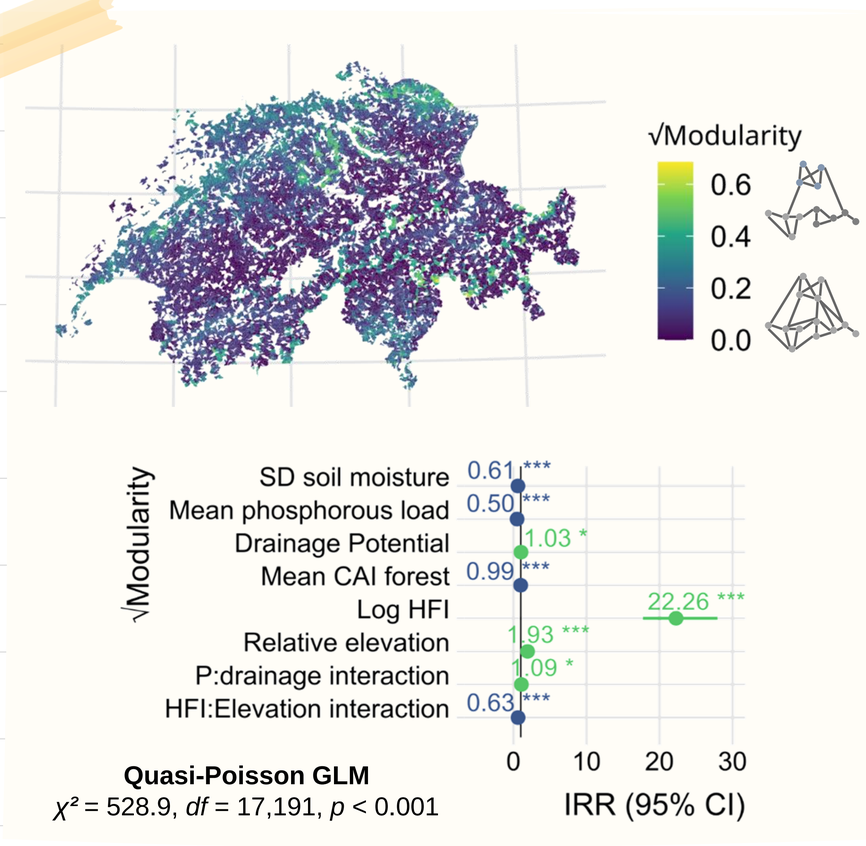


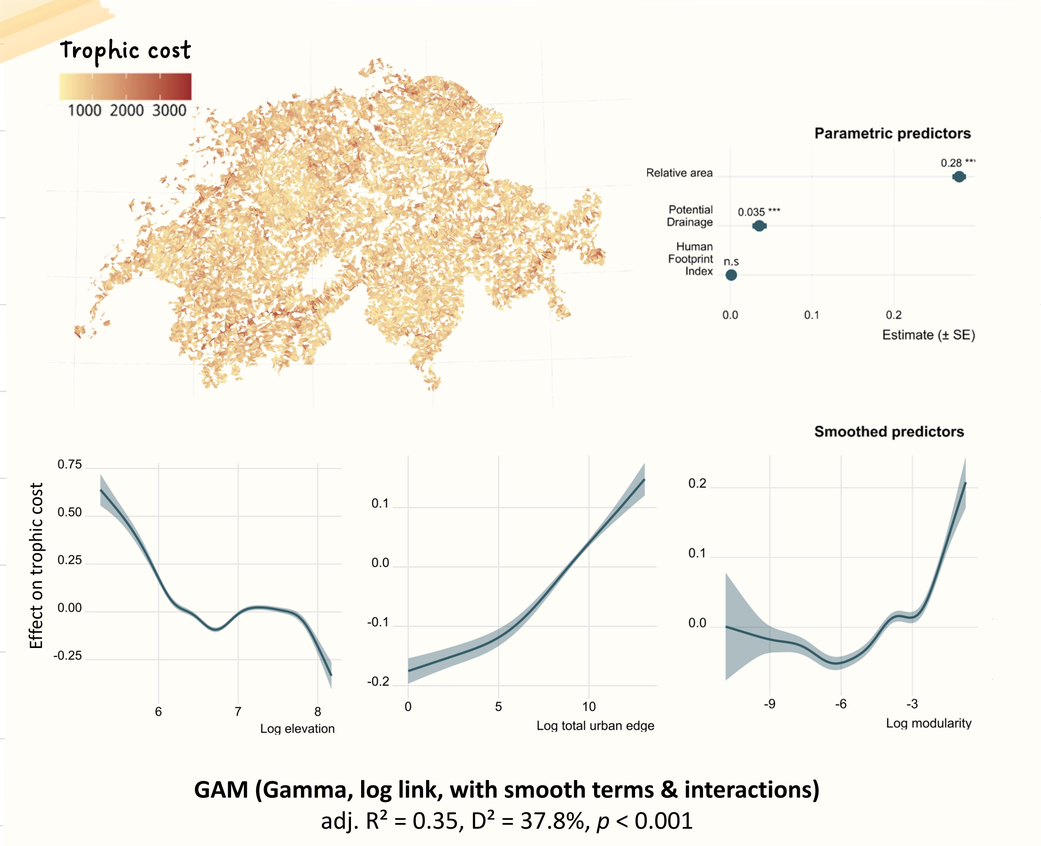
Trophic cost: multi-species connectivity metric quantifying the cost for all consumers in a food web to access potential resources across a landscape



- For each consumer-resource pair, compute the mean least-cost distance from all consumer to all resource locations per catchment
- For each food web, aggregate costs across all consumer-resource links in the catchment

Results: spatial patterns of food-web structure & trophic connectivity





Take home message: maintaining ecosystem functions requires conserving not just species, but also the connectivity of their feeding interactions across space.

References

[1]Reji Chacko, M., Albouy, C., Altermatt, F., Casanelles-Abella, J., Brändle, M., Boussange, V., Campell, F., Ellis, W.N., Fopp, F., Gossner, M.M., Ho, H-C., Joss, A., Kipf, P., Neff, F., Petrović, A., Prié, V., Tomanović, Ž., Zimmerli, N., & Pellissier, L. A species-level multi-trophic metaweb for Switzerland. *Scientific Data* 12, 1164 (2025). https://doi.org/10.1038/s41597-025-05487-7

[2]Fopp, F., Albouy, C., Dahito, M-A., Reji Chacko, M., & Pellissier, L. Swisscatchment: mapping biodiversity at the Swiss scale & catchment resolution. *In prep.*

GfÖ 2025

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Bundesamt für Umwelt BAFU
Office fédéral de l'environnement OFEV
Ufficio federale dell'ambiente UFAM
Uffizi federal d'ambient UFAM

WSL

ETH zürich

D USYS

Ecosystems Landscape Evolution