Analyzing Ecological Networks

FRB-CESAB & ANR ECONET course

FRB
FONDATION
POUR LA RECHERCHE
SUR LA BIODIVERSITÉ

CESAB
CENTRE FOR THE SYNTHESIS AND ANALYSIS
OF BIODIVERSITY

https://econetoolbox.github.io/

22-26 April 2024

CESAB

The context : ANR ECONET

Advanced statistical modelling of ecological networks

« The project aims to **develop statistical methods for analyzing different types of ecological networks**: trophic, mutualistic, competitive or antagonistic and host-parasite systems.

https://cmatias.perso.math.cnrs.fr/ANR_EcoNet.html

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« The project aims to **develop statistical methods for analyzing different types of ecological networks**: trophic, mutualistic, competitive or antagonistic and host-parasite systems.

We are creating a unique consortium combining researchers in **applied statistics** and **ecology** to tackle the challenges of advanced statistical modeling of ecological networks**. »**

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The context : ANR ECONET

Advanced statistical modelling of ecological networks

6 partners:

- LPSM: Catherine Matias (PI), Nathalie Akakpo, Tabea Rebafka, Fanny Villers, Léa Longepierre
- MIA-Paris: Stéphane Robin, Pierre Barbillon, Julien Chiquet, Sophie Donnet, Mahendra Mariadassou, Sarah Ouadah, Timothée Tabouy, Saint-Clair Chabert-Liddel
- IEES: Élisa Thébault, Colin Fontaine, Jérôme Mathieu
- LBBE: Vincent Miele, Stéphane Dray, Wilfried Thuiller, Marc Ohlman, Christophe Botella
- ISEM: Sonia Kéfi, Nicolas Verzelen, Virginia Dominguez
- Evo-Eco-Paleo: François Massol, Alain Celisse, Anne Duputié, Nina Hautekeete, Yves Piquot, Viet Chi Tran, Charlotte Baey, Phuong Thuy Vo.

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The team

- Catherine Matias (LPSM, Paris)
- Sophie Donnet (INRAE, MIA Paris-Saclay)
- Stéphane Robin (LPSM, Paris)
- Elisa Thébault (iEES, Paris)
- François Massol (CIIL, Lille)
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  - Analyze one of the proposed data sets (see next) in groups (4 groups of 5 people each)

Spatio-temporal variation of plant-pollinator networks in the Monte Desert of Villavicencio Nature Reserve, Argentina

Plant-pollinator networks sampled over 6 years, from 2006 to 2011

Data source: Peralta et al. (2020)

The available dataset comprises:

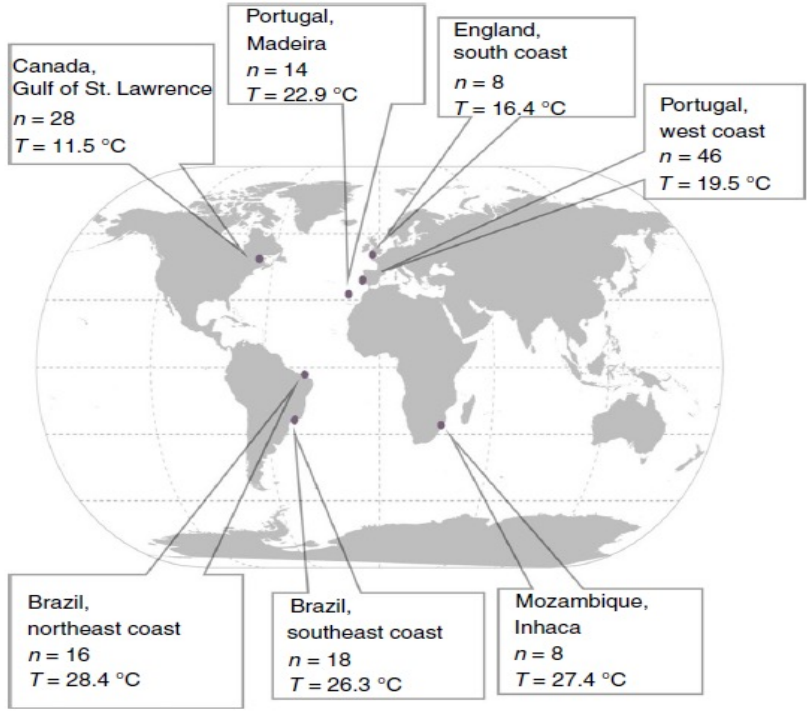
- One plant-pollinator network per year (pooled interactions sampled across different sites)
- One plant-pollinator network per site for a given year (2006)
- Morphological traits of plants and pollinators
- Summed flower abundance per plant species across years

Spatial variation of intertidal food webs along a latitudinal gradient

124 marine rock-pool food webs

Data source: Brose et al. (2019) ; Gauzens et al. (2020)

The available dataset comprises:



- One food web per site (presence/absence of interaction)
- Body mass, metabolic type, and movement type for each species/trophic group

Mutualistic networks along altitudinal and land-use gradients on Mt. Kilimanjaro, Tanzania

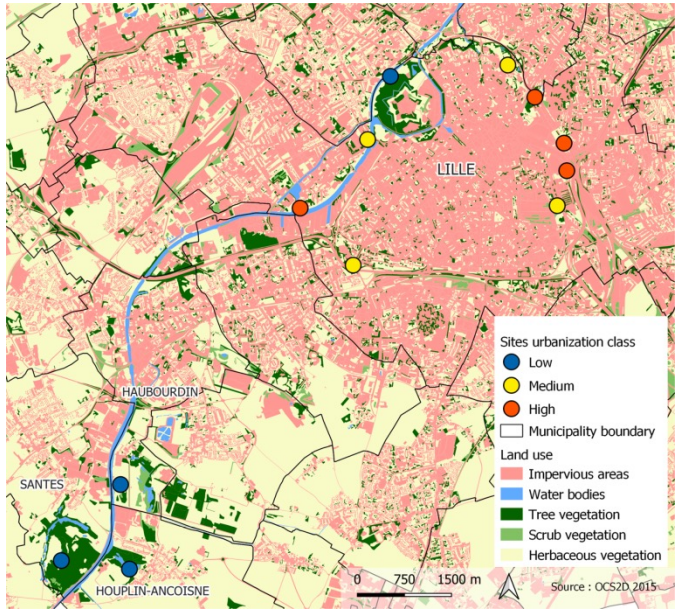
Mutualistic networks sampled over 52 sites for bird–fruit and bird–flower interactions and 19 sites for insect-flower interactions

Data source: Albrecht et al. (2018)

The available dataset comprises:

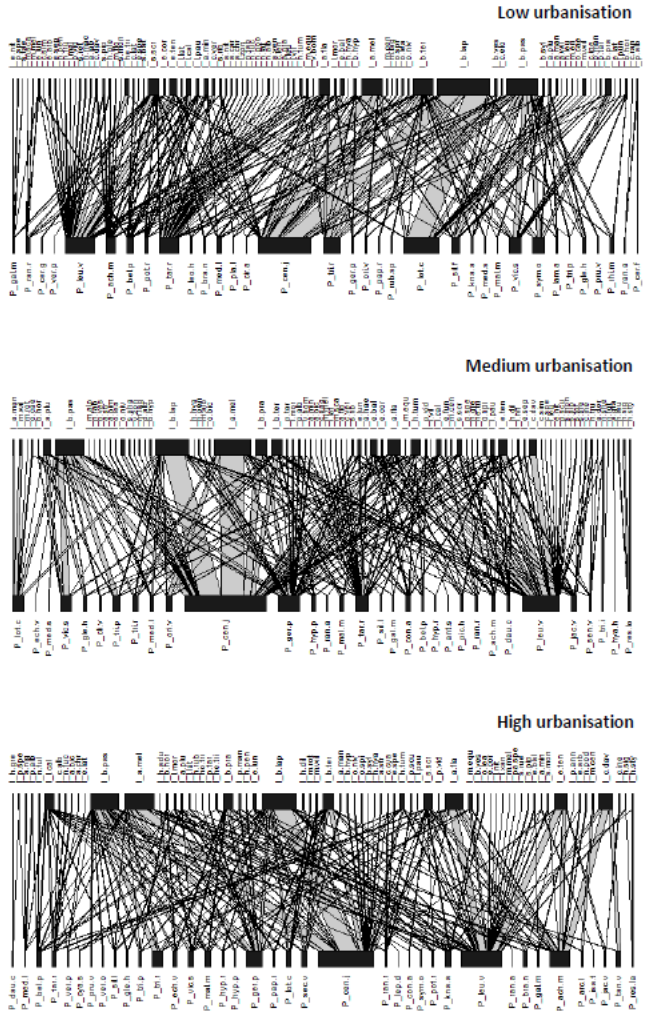
- One mutualistic network per interaction type and per site sampled
- Morphological traits of plants, insects and birds
- Site properties: land use, altitude, mean annual temperature and precipitation

Plant-pollinator networks along an urbanization gradient near Lille, France



12 sites, 4 of each urbanization category
5-6 sampling dates per site (April-June 2017)
All plants, bees and hoverflies identified to species levels
Data source: Fisogni et al. (2022)

Dataset =
one row per capture event, stating
- name of bee/hoverfly sp.
- if captured on plant, name of plant sp.
- site name and urbanization category
- # of the sampling and day of the year



Fisogni, A., Hautekèete, N., Piquot, Y., Brun, M., Vanappelghem, C., Ohlmann, M., Franchomme, M., Hinnewinkel, C. & Massol, F. (2022) Seasonal trajectories of plant-pollinator interaction networks differ following phenological mismatches along an urbanization gradient. *Landscape and Urban Planning,* **226,** 104512.

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- **Group projects:**
  - Analyze one of the proposed data sets (see next) in groups (4 groups of 5 people each)
  - **Chose a group by the end of the day**
  - **Prepare a .Rmd file and a presentation (Friday)**