Multiscale socio-ecological networks in the age of information

Maxime Lenormand, Sandra Luque

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UMR TETIS, Irstea, France

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Motivation

How can we use **ICT data** to model and visualize **complex socio-ecological interactions** to better understand how **people** interact with **natural spaces**?
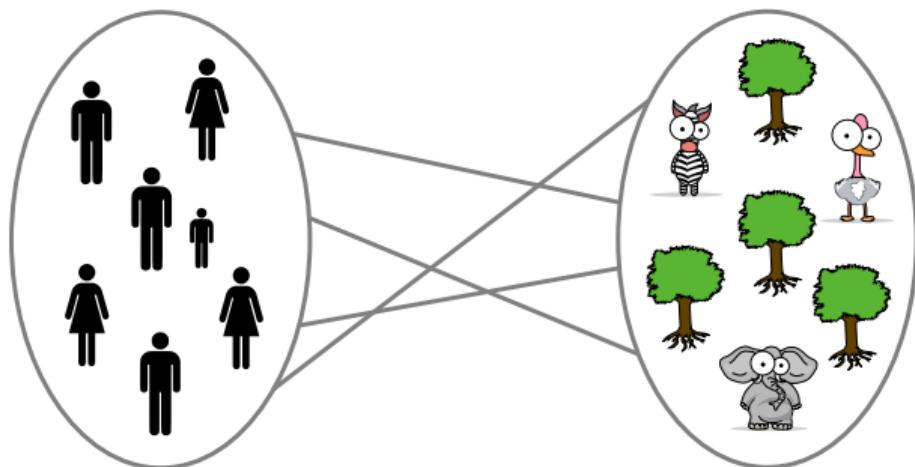
Spatio-temporal network
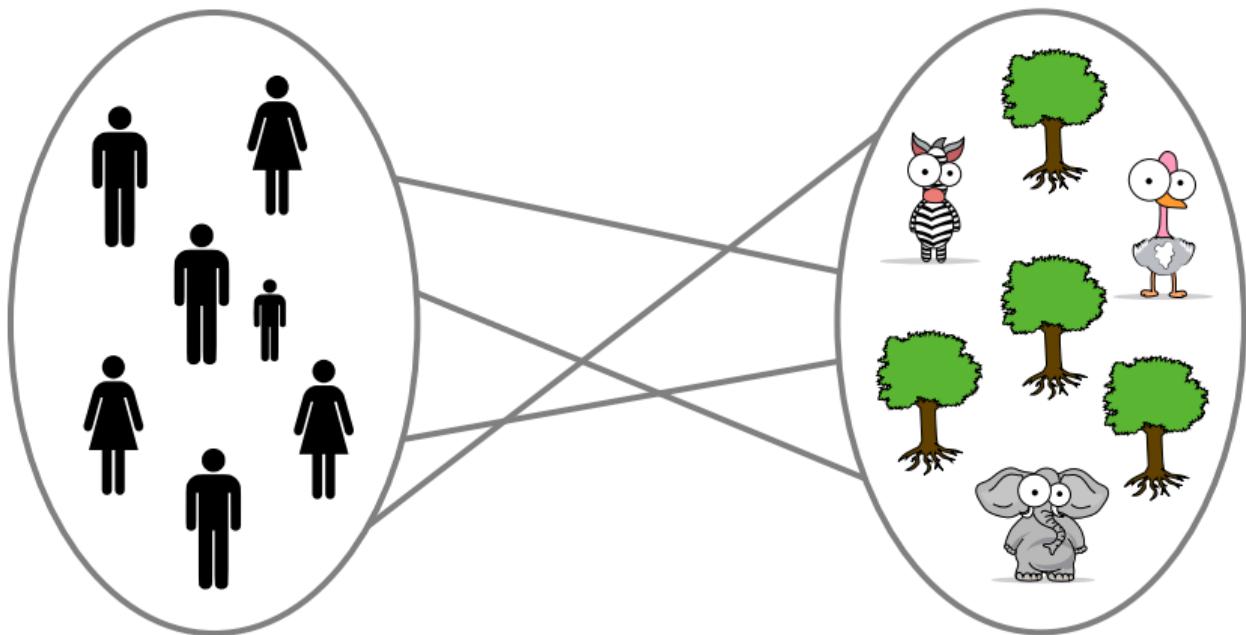
Non-material interactions
(1 hour in 500 x 500 m^2)

Spatio-temporal network
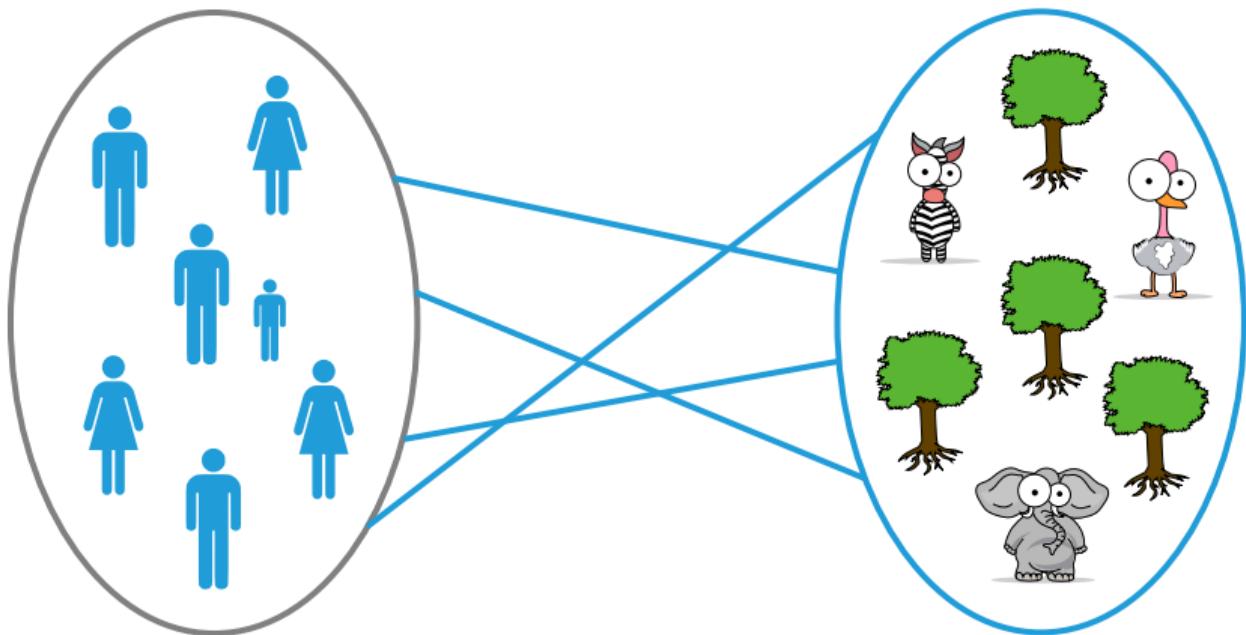
Non-material interactions
(1 hour in 500 x 500 m^2)

Methodological framework
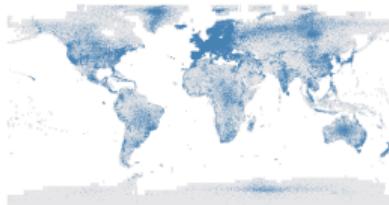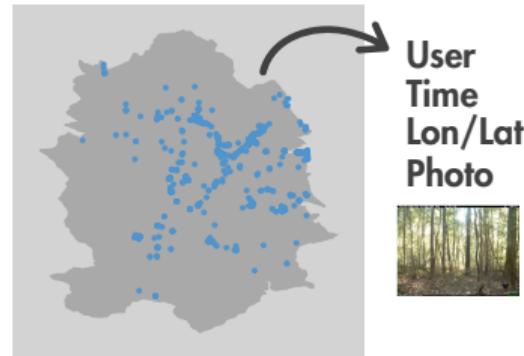
16 case study sites

Map labels: Dovre, Kainuu, Cairngorms, Loch Leven, Warwickshire, De Cirkel, French Alps, Stubai valley, Trnava, Kiskunsag, Vinschgau, Carpathians, Danube, Barcelona, Costa Vicentina, Sierra Nevada

flickr

User
Time
Lon/Lat
Photo

Classify and validate every Flickr photos following the Common International Classification of Ecosystem Services

+ online survey

16 case study sites

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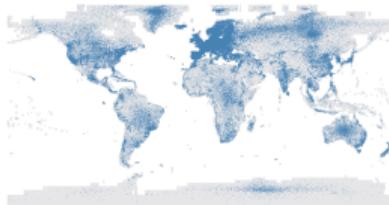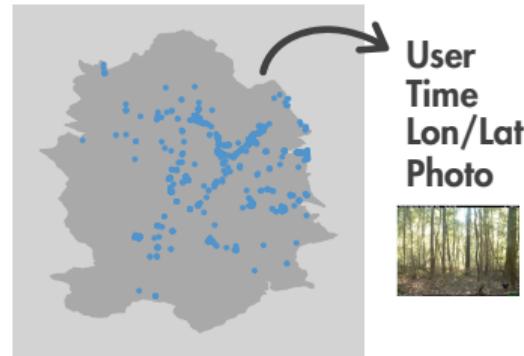
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Flickr data

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Photos classification process

From more than **100,000** to **17,500** photos
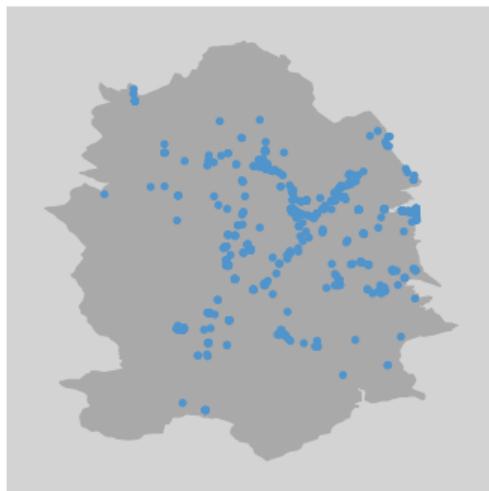
Every Flickr photos has been classified and validated following the Common International Classification of Ecosystem Services

# Methodological framework
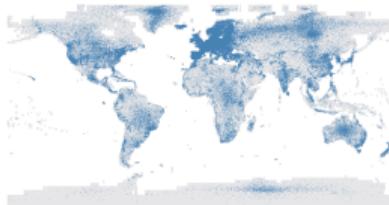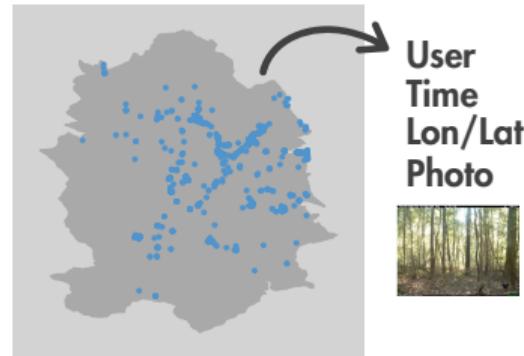
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# Flickr users

Identification of users' place of residence
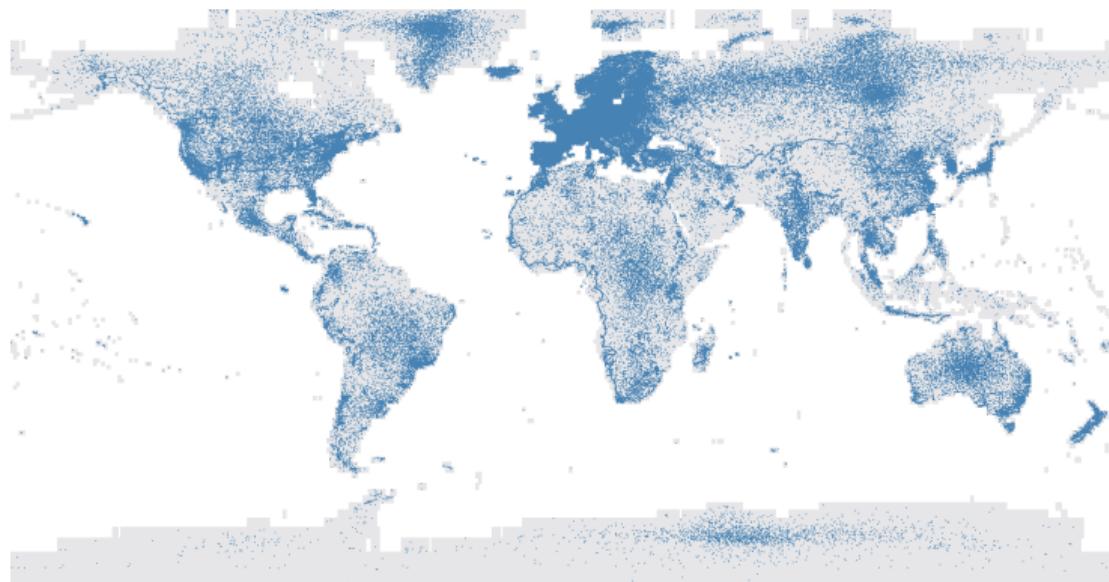
13,000 photos taken by **2,300** users

Methodological framework
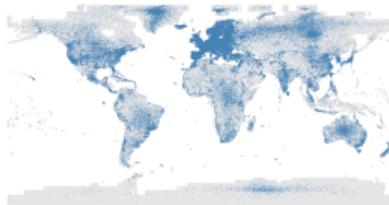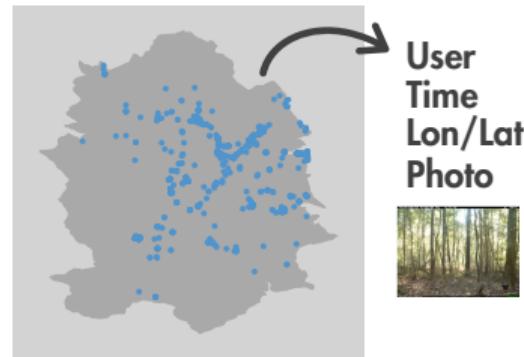

16 case study sites

Dovre · Kainuu · Cairngorms · Loch Leven · Warwickshire · De Cirkel · French Alps · Stubai valley · Trnava · Kiskunsag · Vinschgau · Carpathians · Danube · Costa Vicentina · Barcelona · Sierra Nevada

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Multiscale socio-ecological network
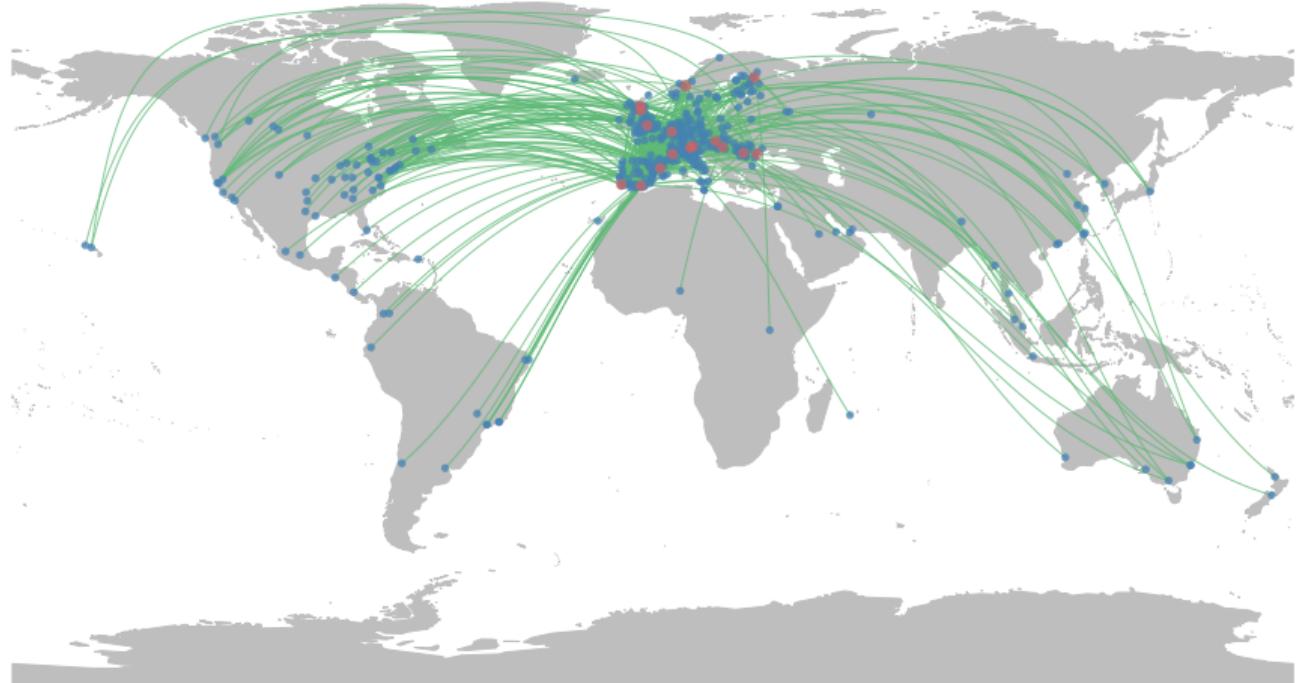
Multiscale socio-ecological network
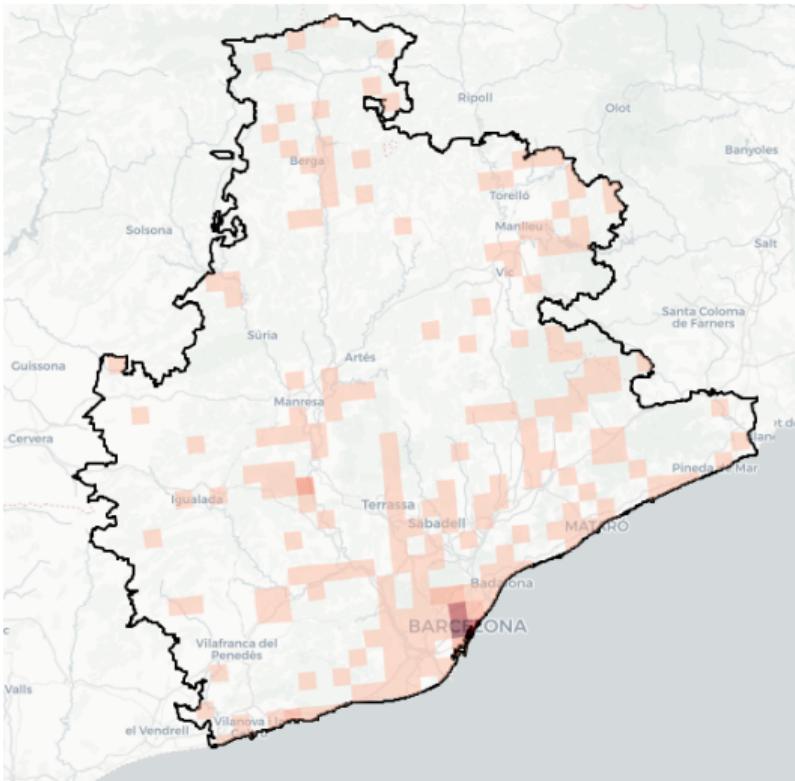
Flickr group & survey

Flickr group & survey

11% response rate
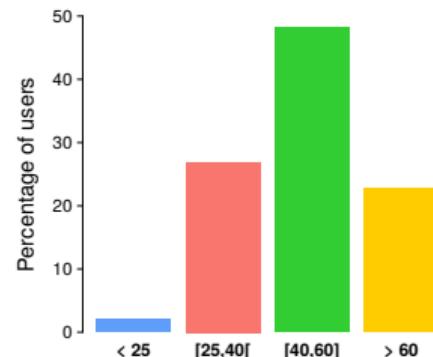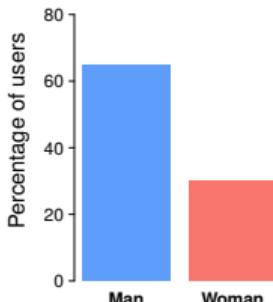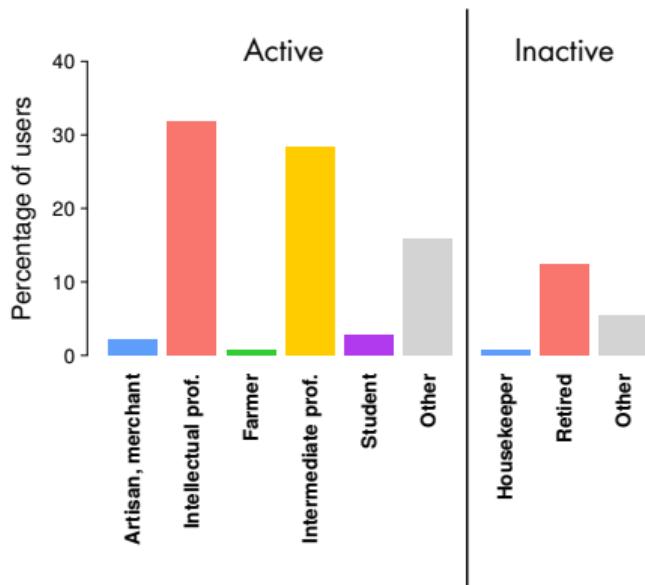
90% of accuracy in the users' place of residence detection!

How does the distance to a site influence the way people explore and interact with this site?

# Sites' attractiveness
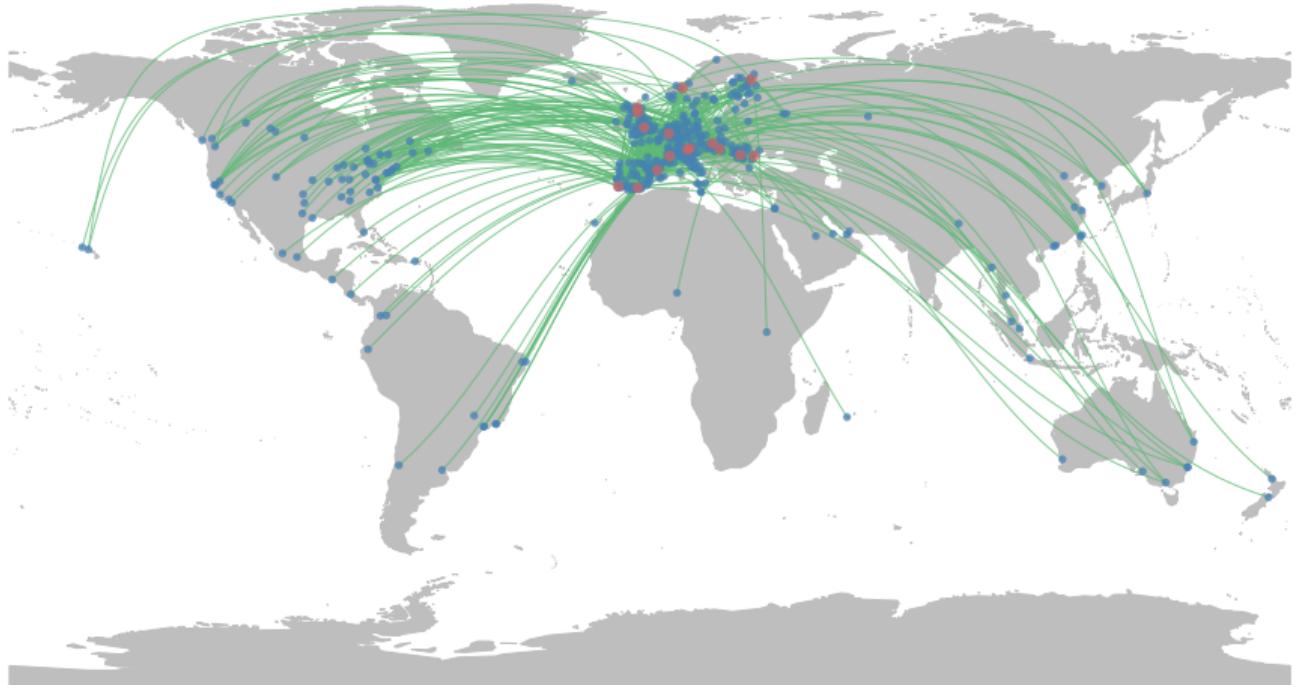
# Sites' attractiveness
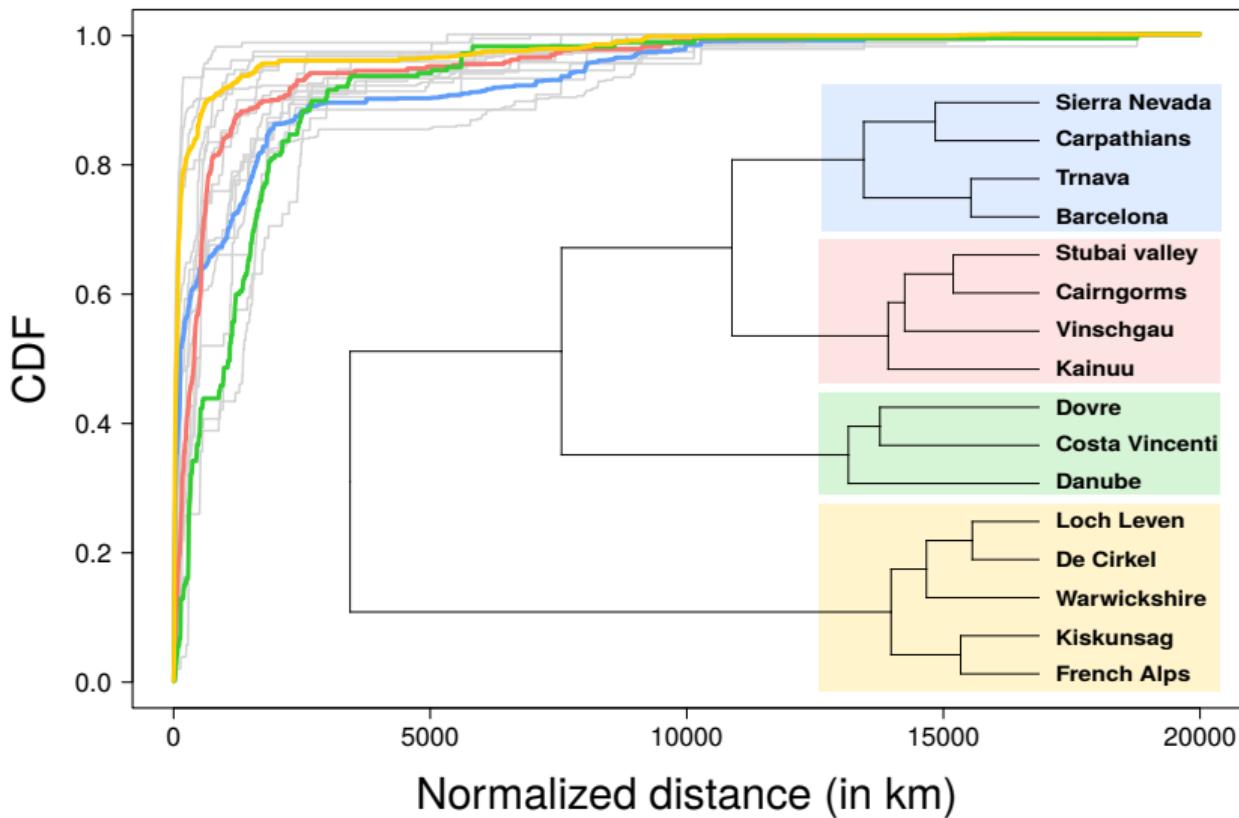
Distribution of interactions

Landscape diversity
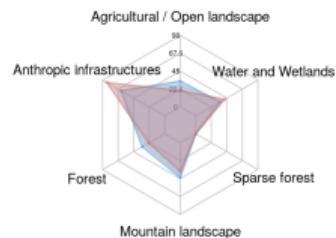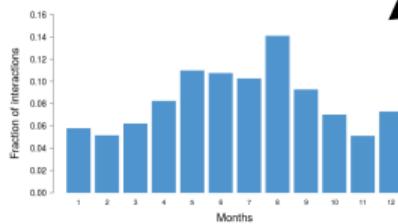
Space (cells)

Time (months)
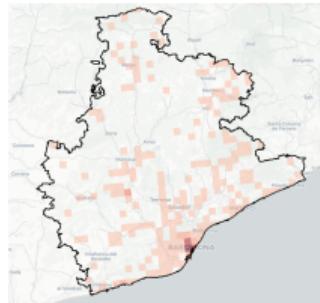
# Effect of the distance traveled
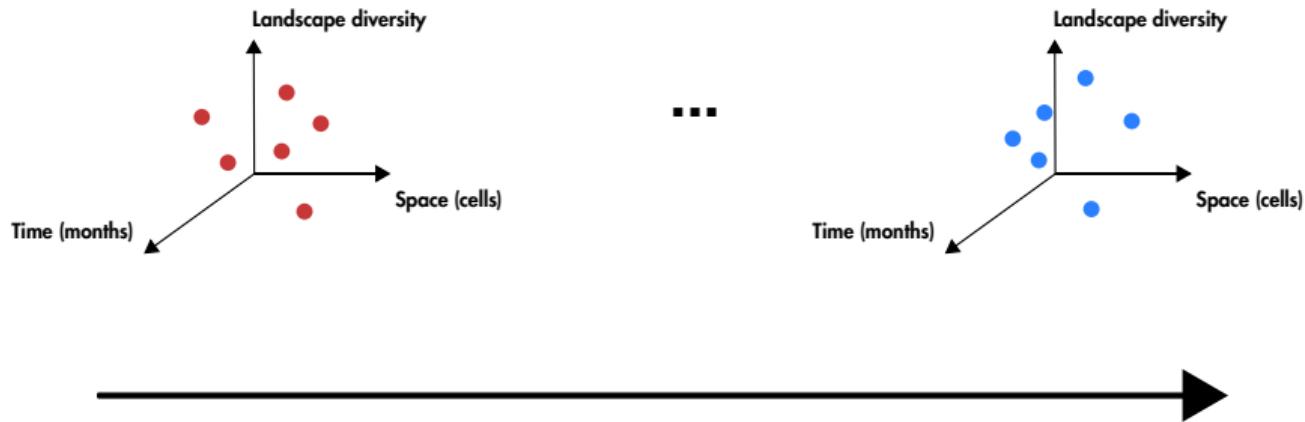
**Impact of the distance
on the distribution**

Median effect
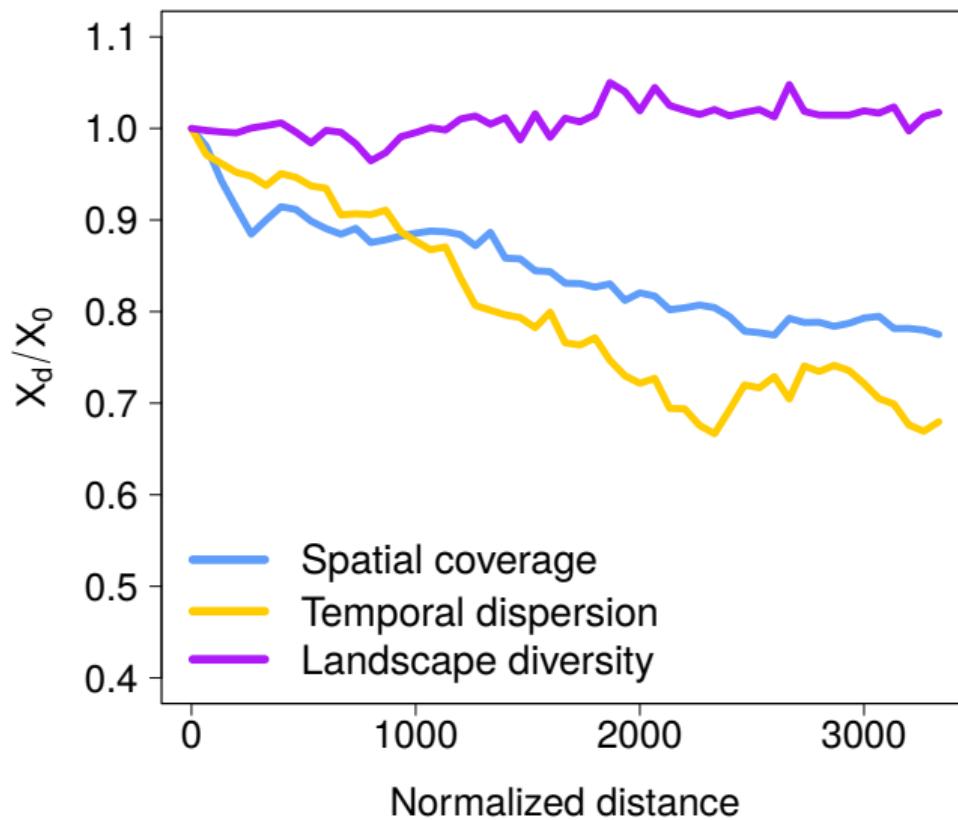
Locals & visitors overlaps

(a) Spatial overlap, (b) Temporal overlap, (c) Landscape overlap for: Barcelona, Cairngorms, Carpathians, Costa Vicentina, Danube, De Cirkel, Dovre, French Alps, Kainuu, Kiskunsag, Loch Leven, Sierra Nevada, Stubai valley, Trnava, Vinschgau, Warwickshire
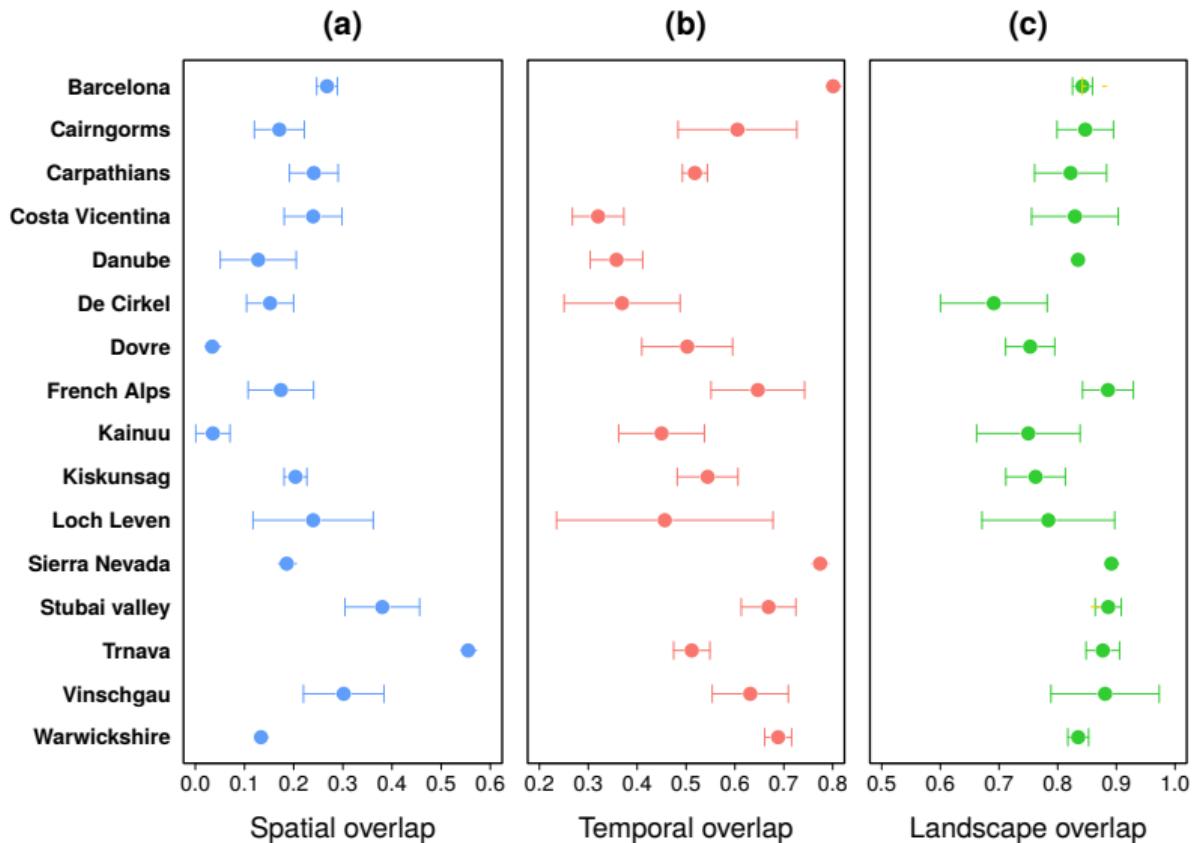
Take home message

Modelling of social-ecological interactions
with a spatio-temporal network & ICT data

**Diversity of spatio-temporal contexts,
individuals and type of interactions**

↓

Resilience planning

Lenormand *et al.* (2018) Multiscale socio-ecological networks in the age of information.
arXiv preprint arXiv:1805.00734.

AHIA project outputs

https://www.maximelenormand.com/Codes/