

Mapping ecological connectivity in the European Alps

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Importance of ecological connectivity in the Alps

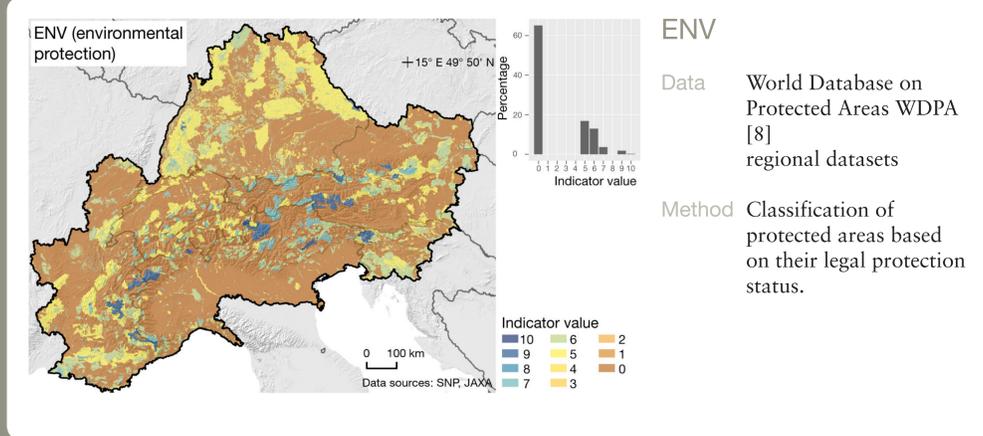
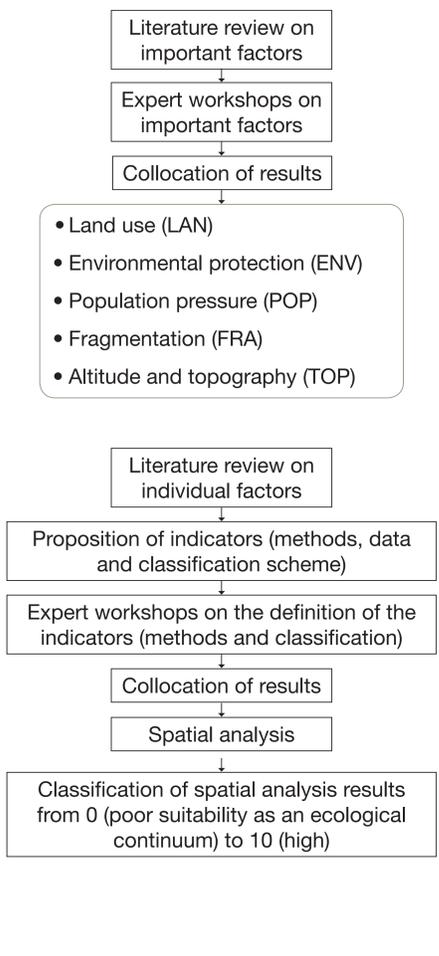
- Global decrease of species richness [1-2]
- Mounting evidence that biodiversity loss alters the functioning of ecosystems [3]
- Mountain ecosystems such as the European Alps exhibit high species richness wherefore they are crucial for global biodiversity conservation [4]
- Species loss due to climate change [e.g. 5]
- Ecological connectivity important to allow for movement due to climate change [6]
- Genetic connectivity in the protected area network of the European Alps is not sufficient to protect vulnerable species [7]

Aims

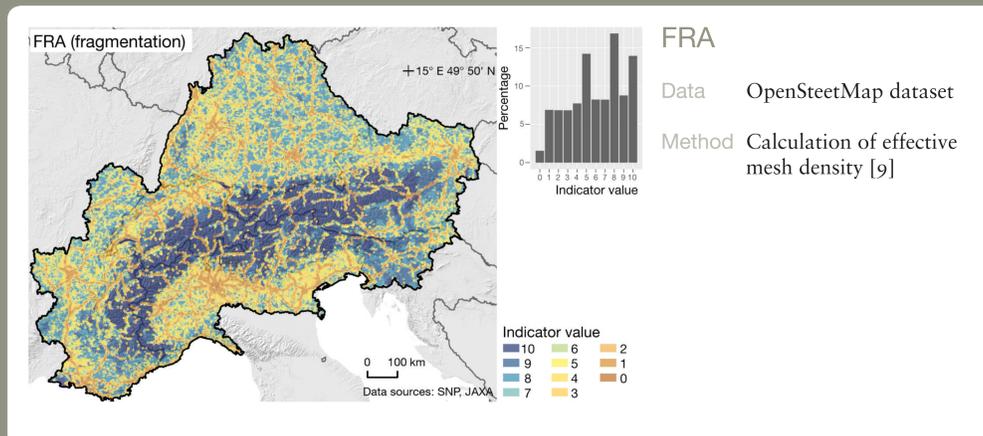
- Provide an overview on ecological connectivity in the European Alpine macro-region
- Assess the entire landscape with regard to its suitability to contribute towards protecting and maintaining functioning ecosystems
- Support the decision-making process for policy development and implementation on landscape planning

Development of indicators

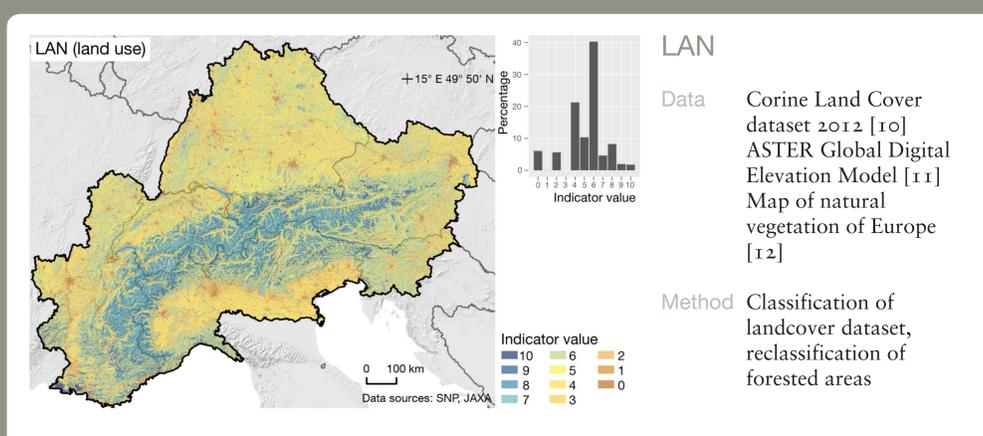
Develop a spatially explicit set of indicators that determine ecological connectivity by applying the following procedure:



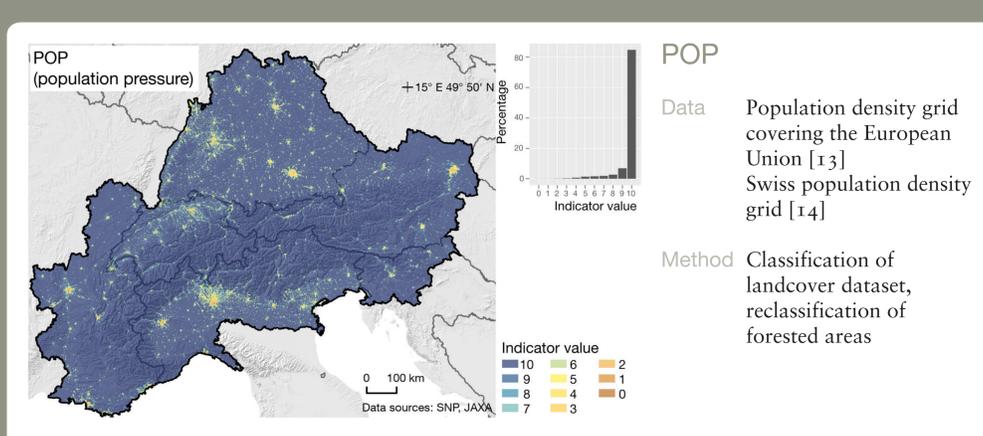
ENV
Data World Database on Protected Areas WDPA [8]
regional datasets
Method Classification of protected areas based on their legal protection status.



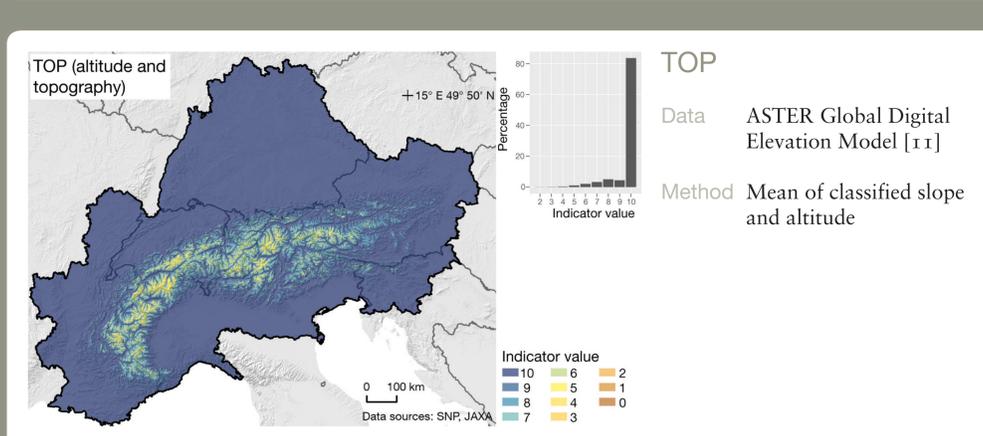
FRA
Data OpenStreetMap dataset
Method Calculation of effective mesh density [9]



LAN
Data Corine Land Cover dataset 2012 [10]
ASTER Global Digital Elevation Model [11]
Map of natural vegetation of Europe [12]
Method Classification of landcover dataset, reclassification of forested areas



POP
Data Population density grid covering the European Union [13]
Swiss population density grid [14]
Method Classification of landcover dataset, reclassification of forested areas

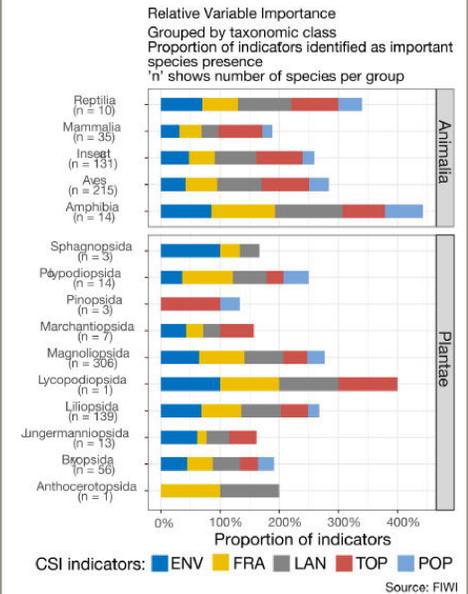


TOP
Data ASTER Global Digital Elevation Model [11]
Method Mean of classified slope and altitude

Comparison to species data

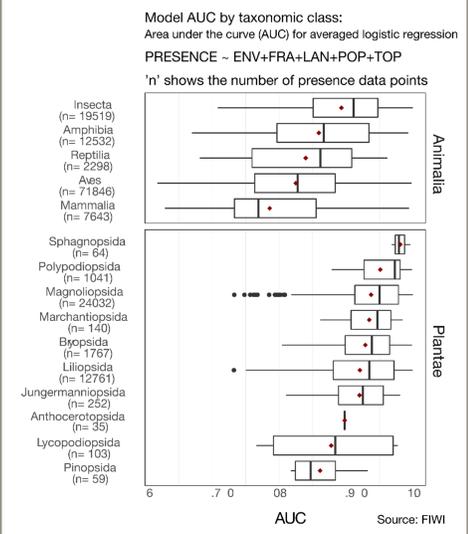
Species presence data from France (GBIF [15]), Slovenia (Natura 2000 data [16]) and Switzerland (data on red listed species of national data centers [17]).

Method Binomial generalized linear models were calculated for each species and regional dataset to predict the influence of the CSI indicators on their presence. Model averaging was performed on all models, which resulted in an output with averaged estimates and relative variable importance values.



Predictions were calculated for the indicators using the averaged models.

Area under the curve (AUC) were extracted from the averaged models to assess model performance.



Conclusions

- high-alpine areas most suitable for functioning of ecosystems
- marked obstacles in the inner-alpine valleys and the areas surrounding the Alps