Developing a Connected Trans-European Nature Network: Lessons from NaturaConnect's Pan-European Connectivity and Conservation Planning

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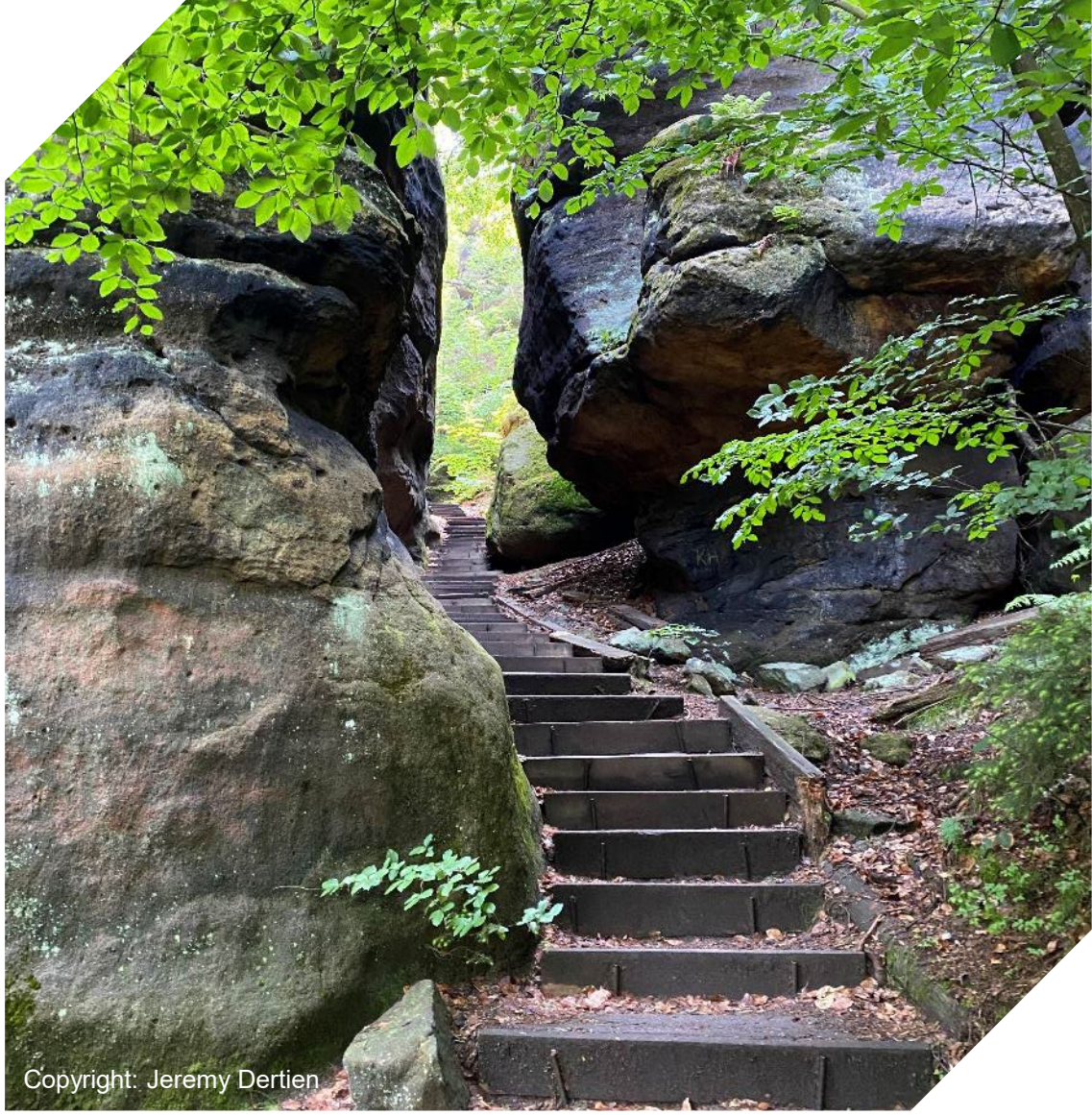

Funded by the European Union

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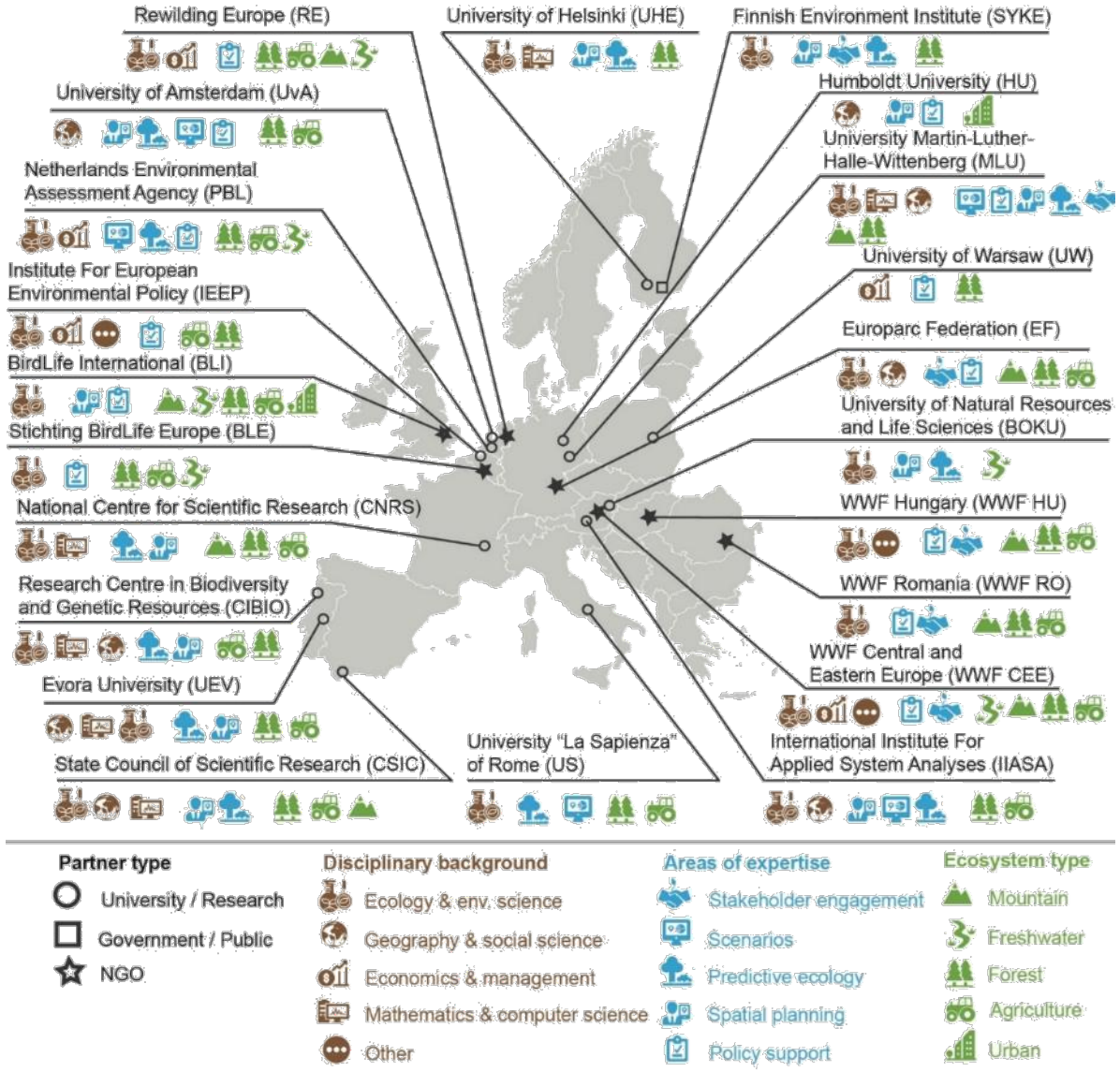
Knowledge & Data

Tools

Capacity Building

To realize an ecologically representative, resilient and well-connected **Trans-European Nature Network**

22 partner institutions from **12** different countries



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Objectives of NaturaConnect

To support countries in designing a Trans-European Nature Network (TEN-N)

to **protect** **at least 30% of the land**, with at least **10% under strict protection** (EU Biodiversity Strategy)

to implement **ecological restoration** **on 20%** of land (Nature Restoration Regulation)

Enhance **ecological connectivity** and increase the **network resilience** to changes

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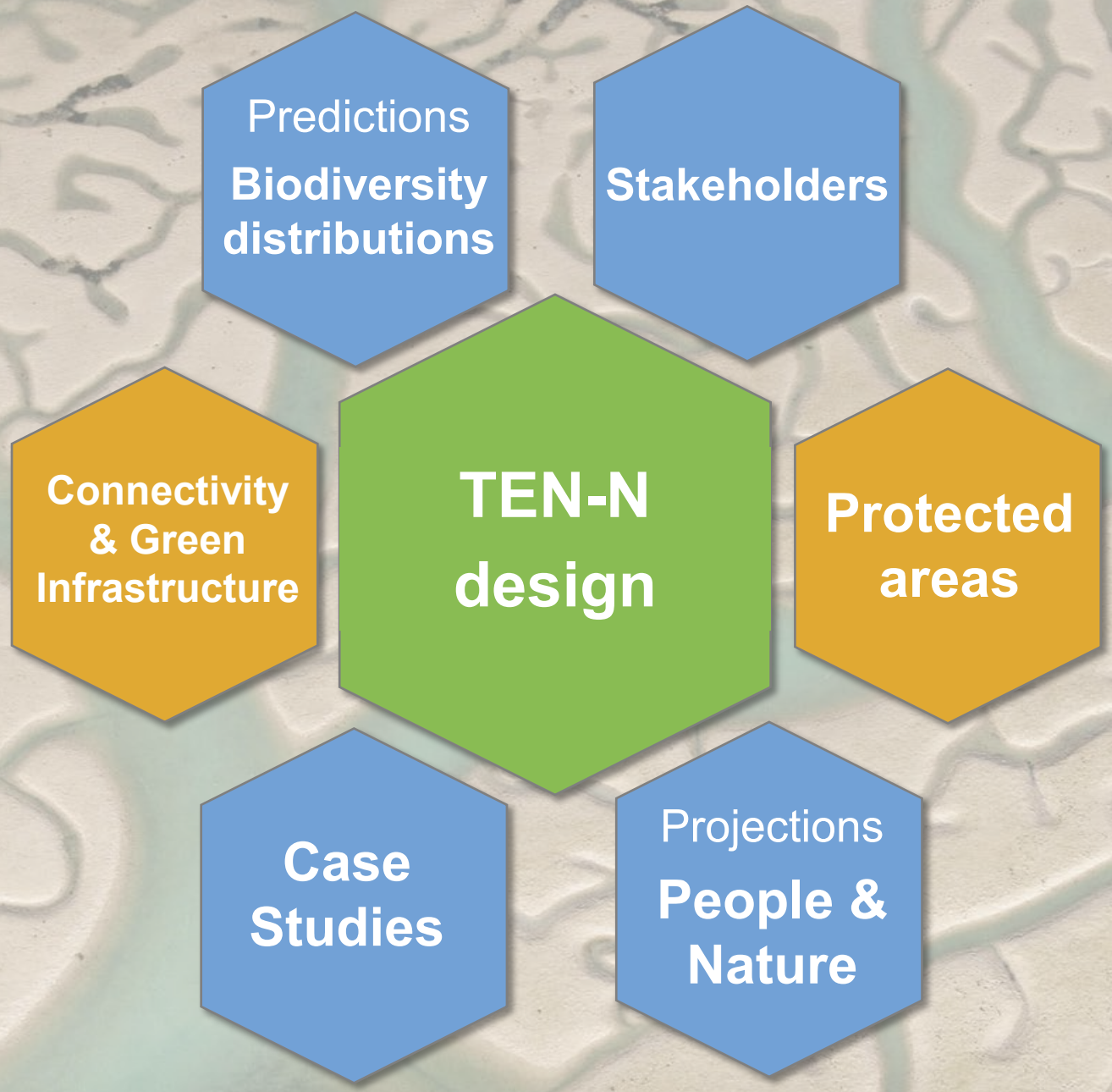

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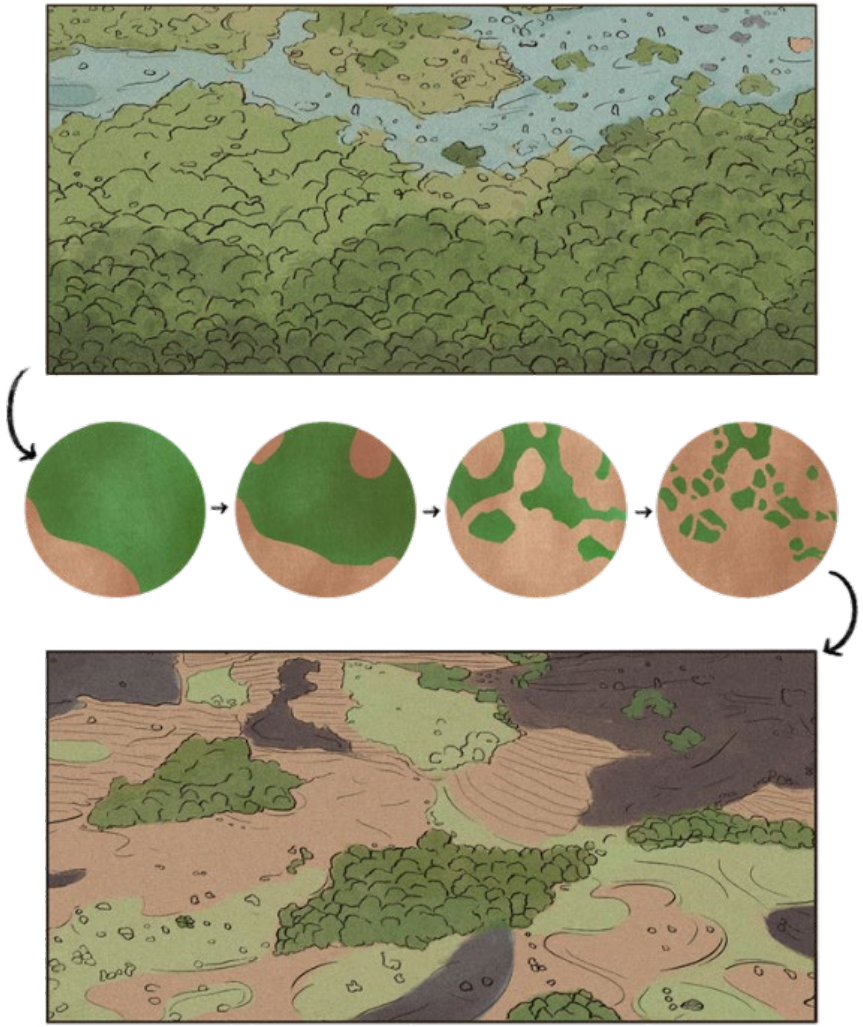
Global Attention on Connectivity

A measure of spatial continuity

- Habitat fragmentation is reducing viable habitat
- Fragmentation can reduce:
  - *Dispersal*
  - *Genetic diversity*
  - *Reproduction*
  - *Population abundance*
  - *Nutrient flows*
- Wide variety of area & time scales
  - *Individual movement → a century of genetic flow*
  - *Climate change range shifts*



Wildlife Conservation Society, 2020

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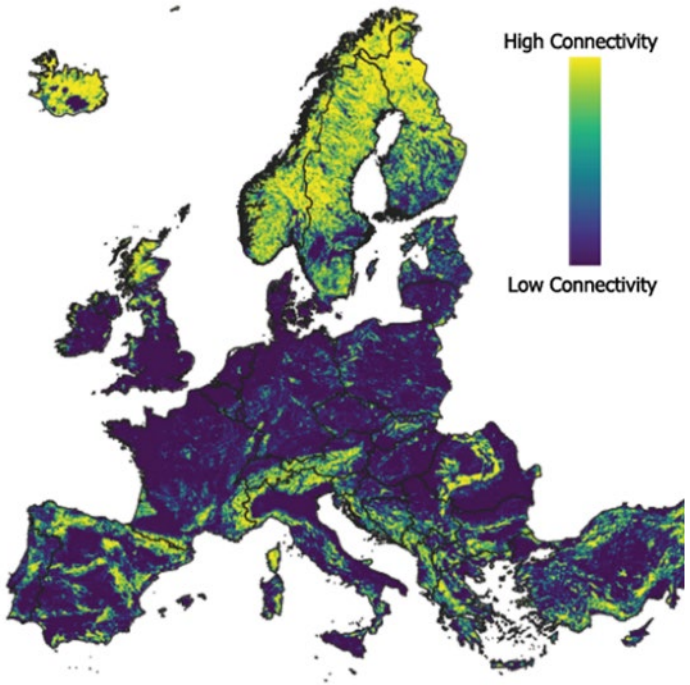
Connectivity Planning from Multiple Perspectives

Structural connectivity

EUNIS habitats fragmentation



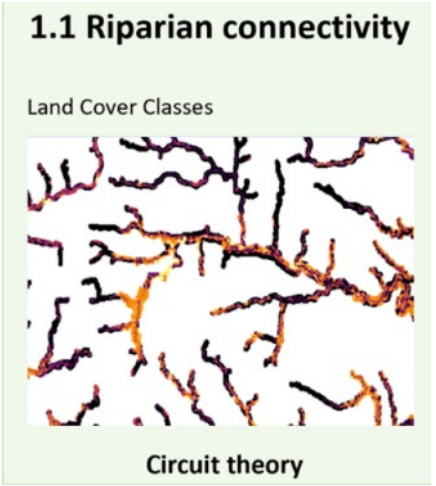
Poulsen et al. in prep.

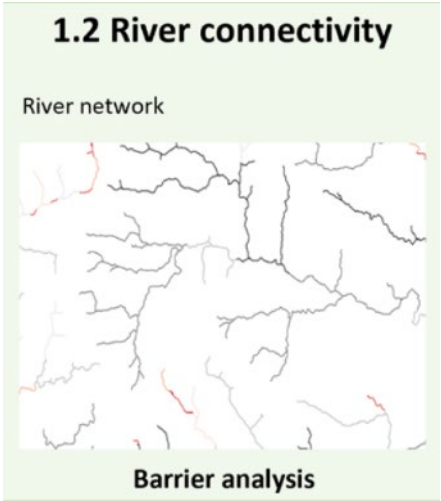
Functional connectivity

for 30 species archetypes

Dertien et al. in prep.

Freshwater & Riparian connectivity





Planillo & Hermoso et al. in prep.

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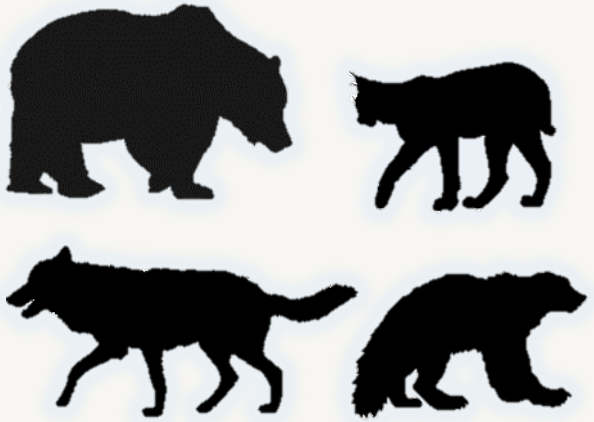
Large Carnivore Normalized Current Density

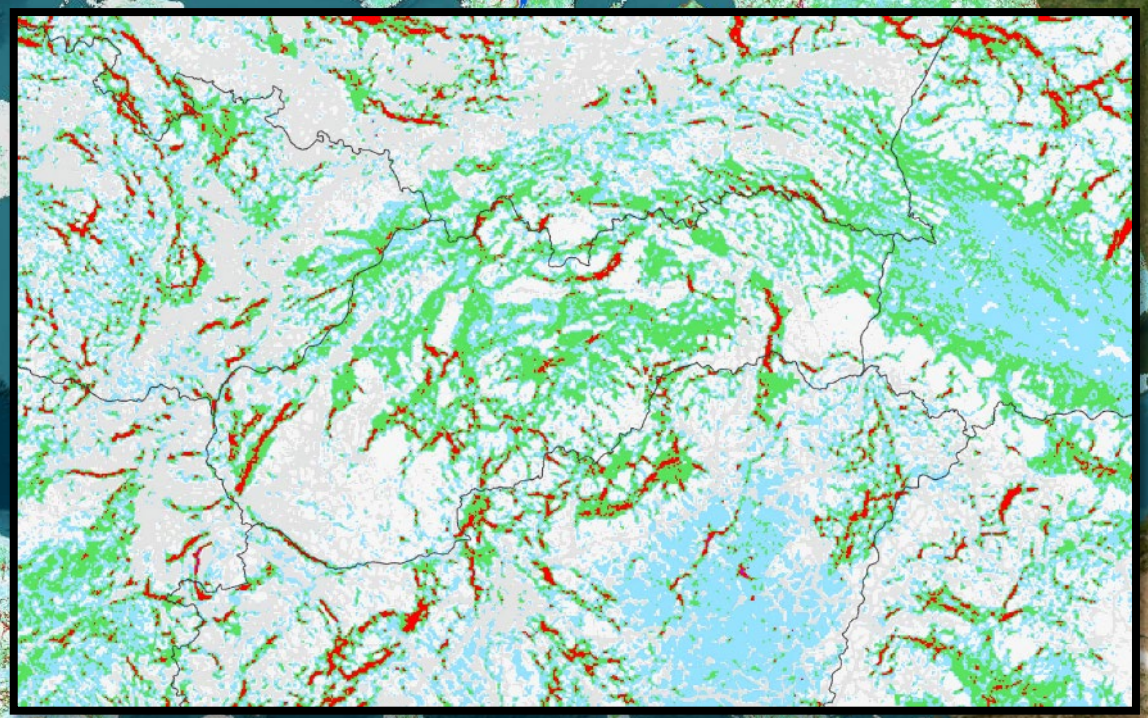


Blocked

Diffuse

Intensified

Channelised



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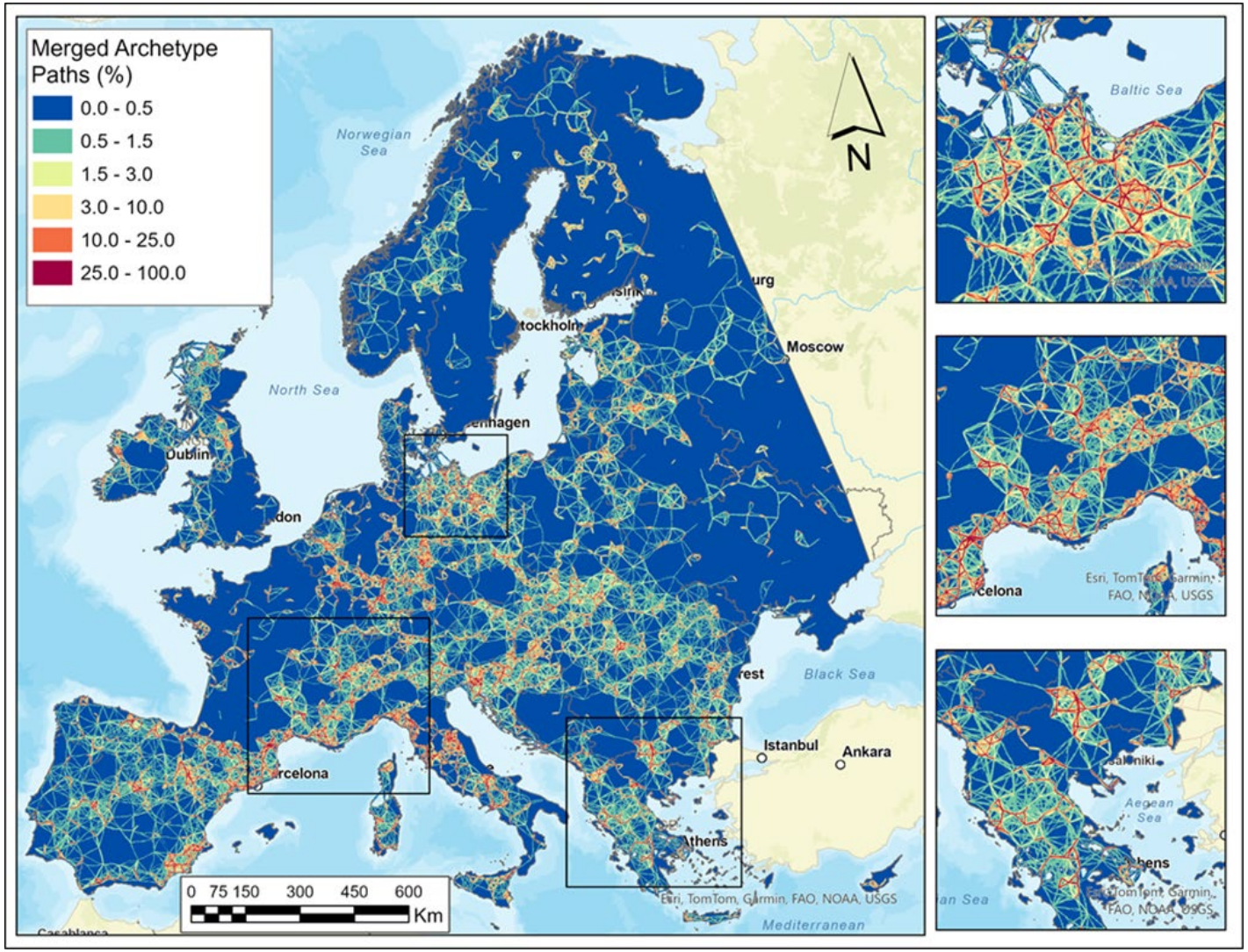
Protected Area Ecological Corridors

Overlap of Vertebrate Connectivity

- Final overlay of corridors for 30 species archetypes (~76,000 corridors)
- Multifunctional corridors possible for very different taxa
- ~600,000 km² to completely protect one-third of vertebrate connectivity
  - ~900k km² for total vertebrate connectivity conservation

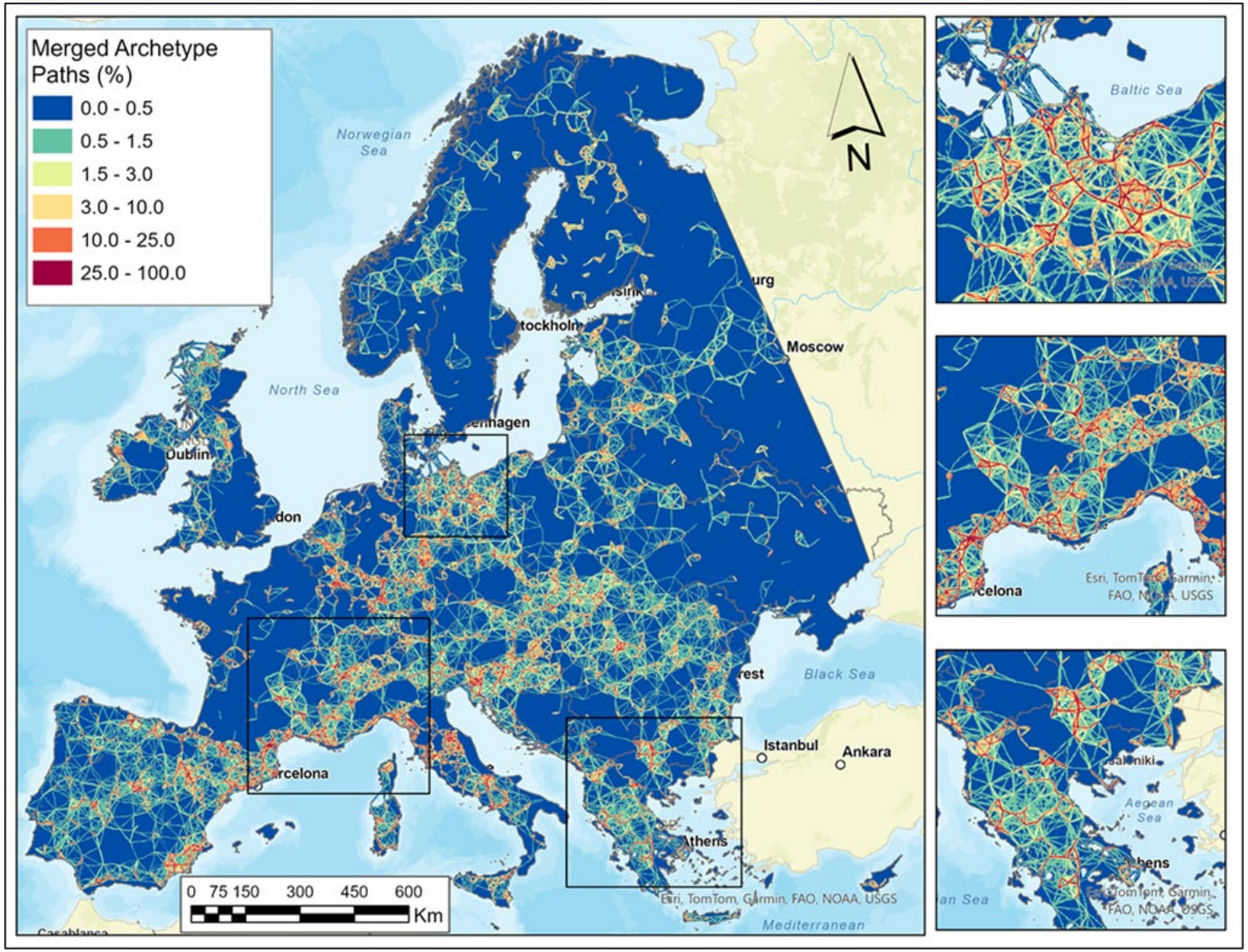


Preliminary Results

Protected Area Ecological Corridors

Overlap of Vertebrate Connectivity

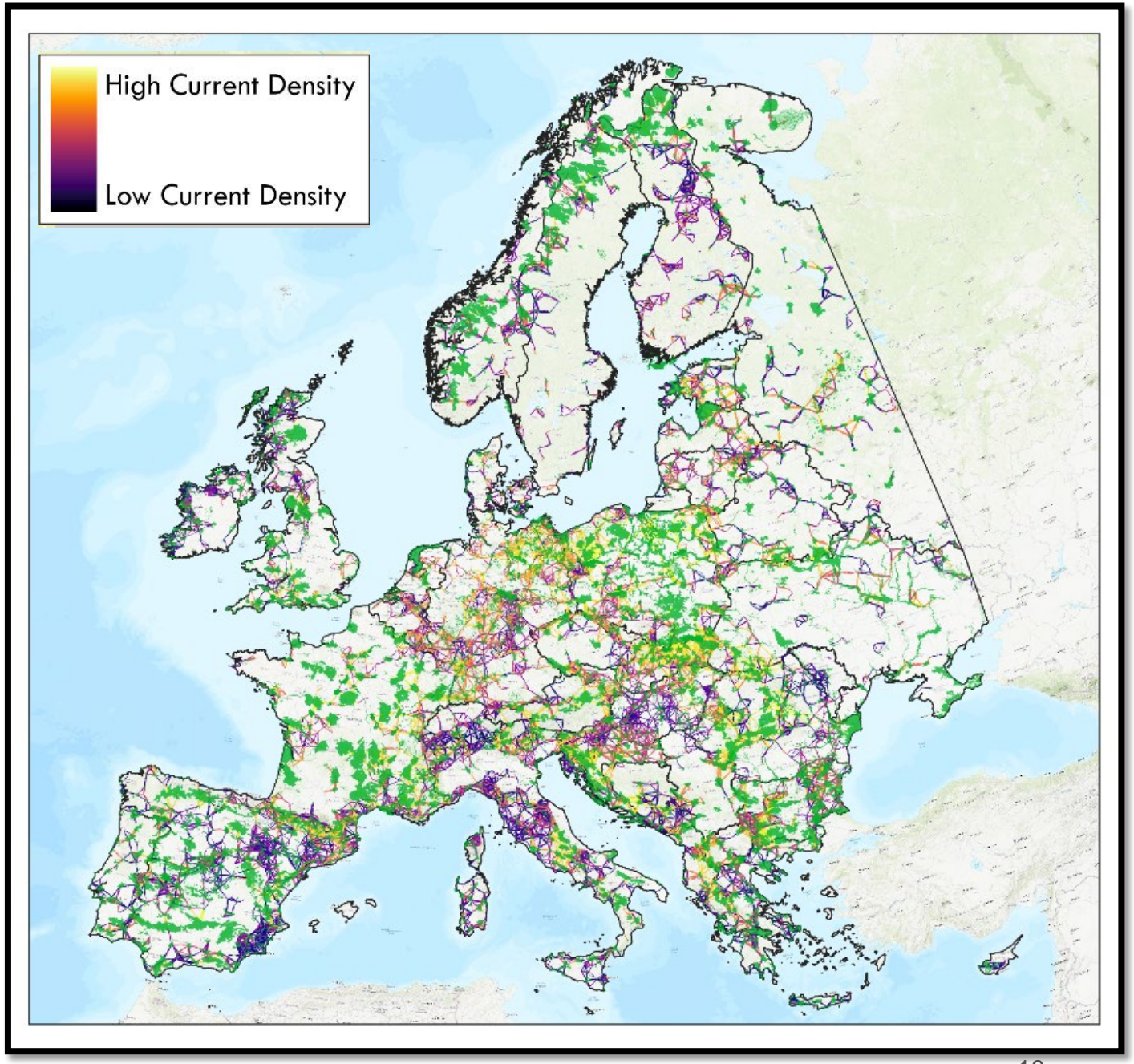
- Highest corridor overlaps in Italy, Carpathians, Pyrenees to Rhône Valley, etc.
- Major overlap Mediterranean biogeographic region
- Useable corridor data for single archetype or all vertebrate biodiversity



Preliminary Results

Continental Corridor Priorities

- Bring different connectivity metrics together
  - Priority corridor index
- Priorities across Europe
  - Concentrations in large mountainous PAs, especially transboundary
- Mediterranean biogeographic region especially a priority for most terrestrial vertebrates

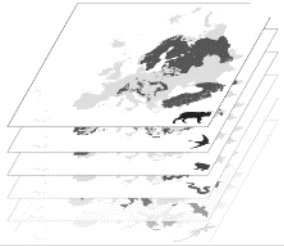


Preliminary Results

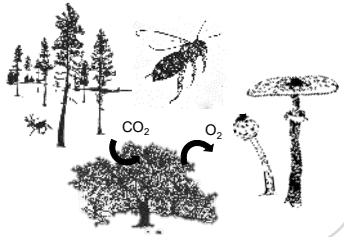
Where to protect & restore ecosystems in Europe?

Designing a TEN-N that is comprehensive, resilient, connected, and feasible

>1400 species and >200 habitats

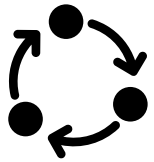


>15 ecosystem services (ES)

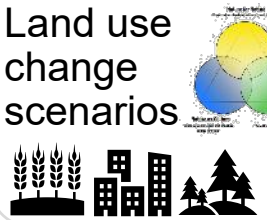


Climate change

Connectivity



Land use change scenarios



Costs

Area sharing

Protected areas

Spatial conservation prioritization

Top priority areas:

30% protected areas

10% strict protection

20% restoration

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We create 144 alternative TEN-N scenarios:

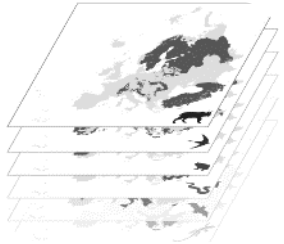
For 30% conservation, 10% strict protection, 20% restoration

- **Equitable area sharing** between countries, bioregions, or none (x3)
- **Baseline for 30%**: all protected areas; Natura2000 only (x2)
- **Climate**: prioritize climate-resilient areas or not (x2)
- **Connectivity:** prioritize protection of important corridors or not (x2)
- **Nature's values**: Nature for Nature, for Society, as Culture (x3)
- **Costs**: focus on biodiversity only, or avoid high opportunity costs (x2)

Where to protect & restore ecosystems in Europe?

Designing a TEN-N that is comprehensive, resilient, connected, and feasible

>1400 species and >200 habitats



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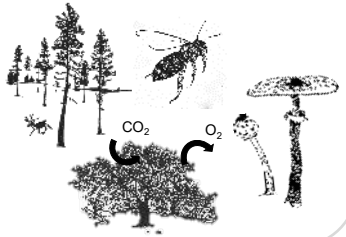
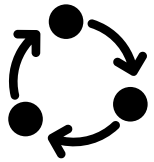


Climate change

Connectivity



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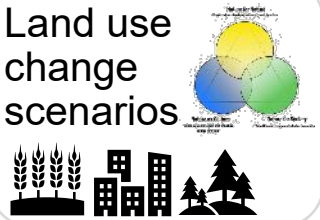
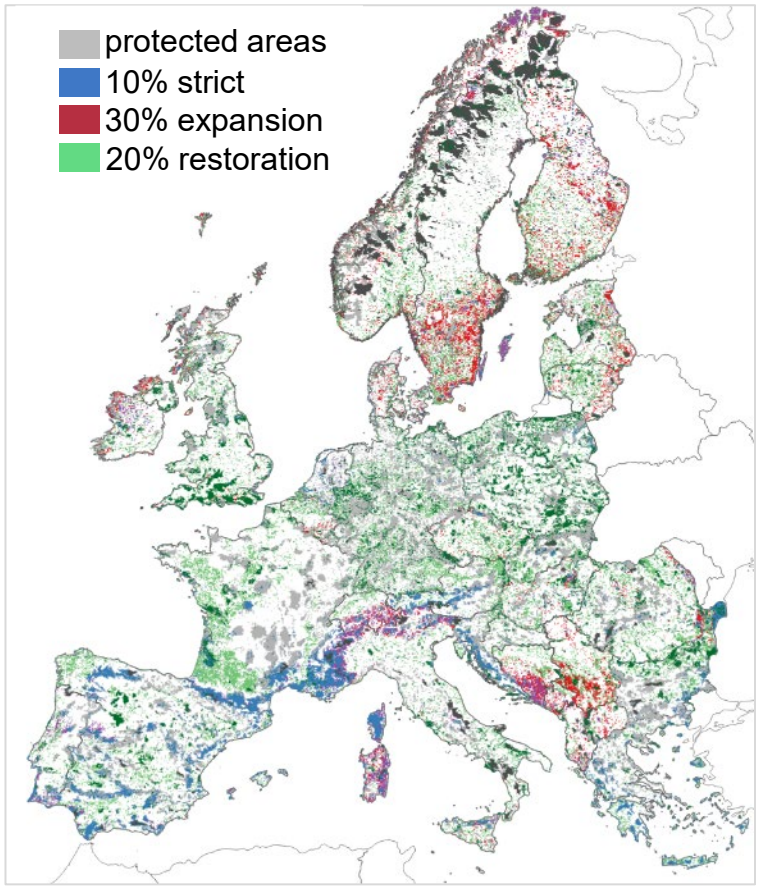


Costs

Area sharing

Protected areas

Spatial conservation prioritization



Priority areas are designed to be climate-resilient, connected, and maximize gains for biodiversity and ecosystem services

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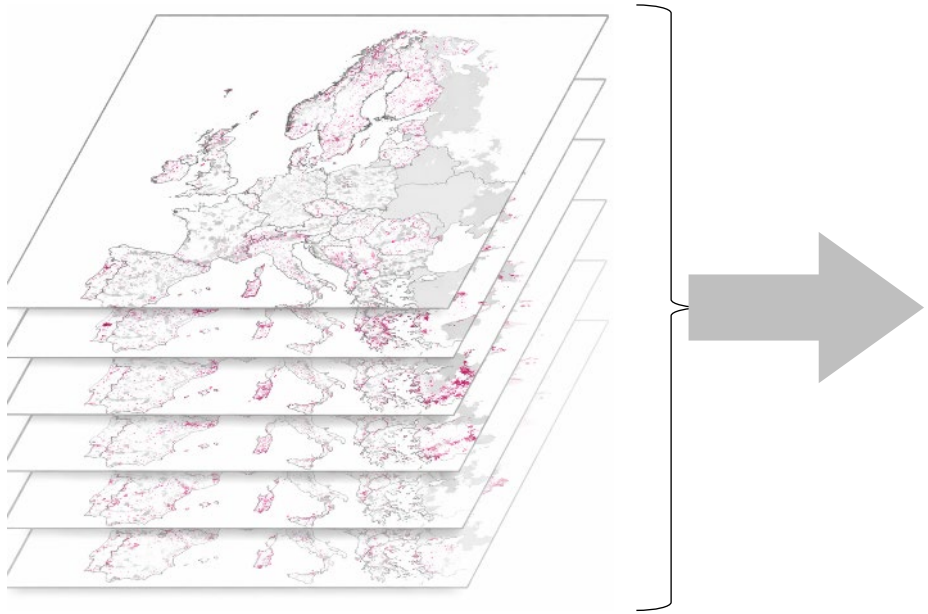
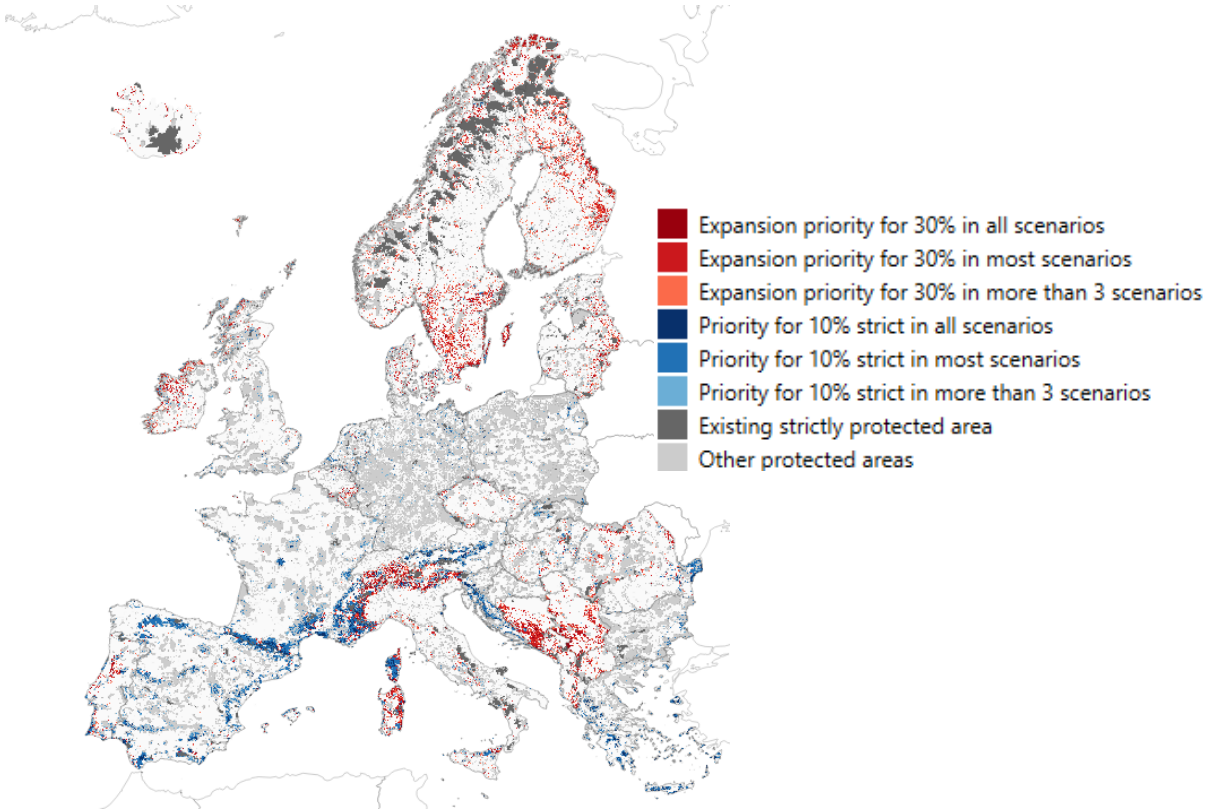
Which areas are always selected across scenarios?

‘Consensus’ areas are of high importance across all planning criteria

12 variant scenarios





Consensus map of priority areas for 30% and 10% strict across 12 variant scenarios

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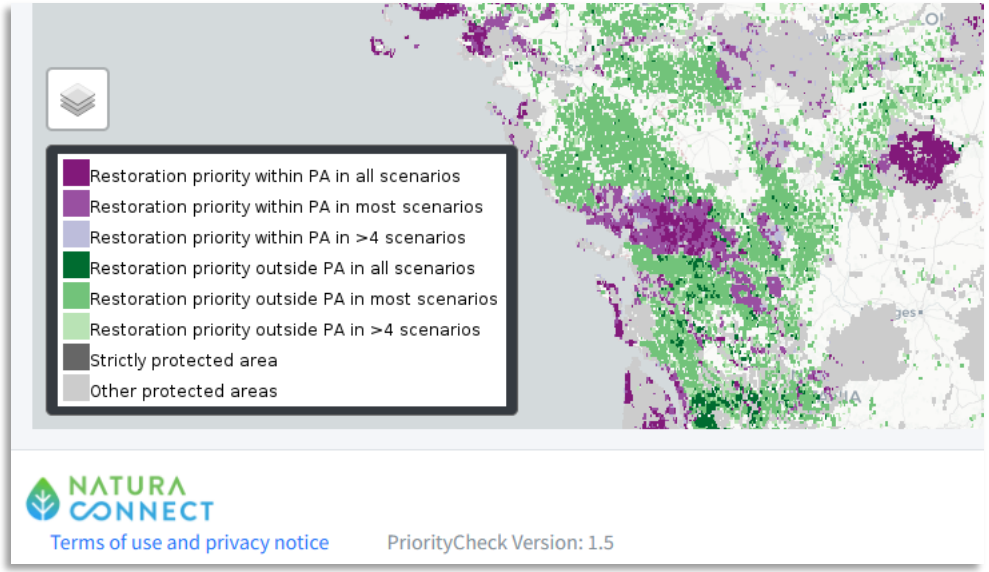
Preliminary Results

Interactive Scenarios & Maps

Fully Launched this Summer

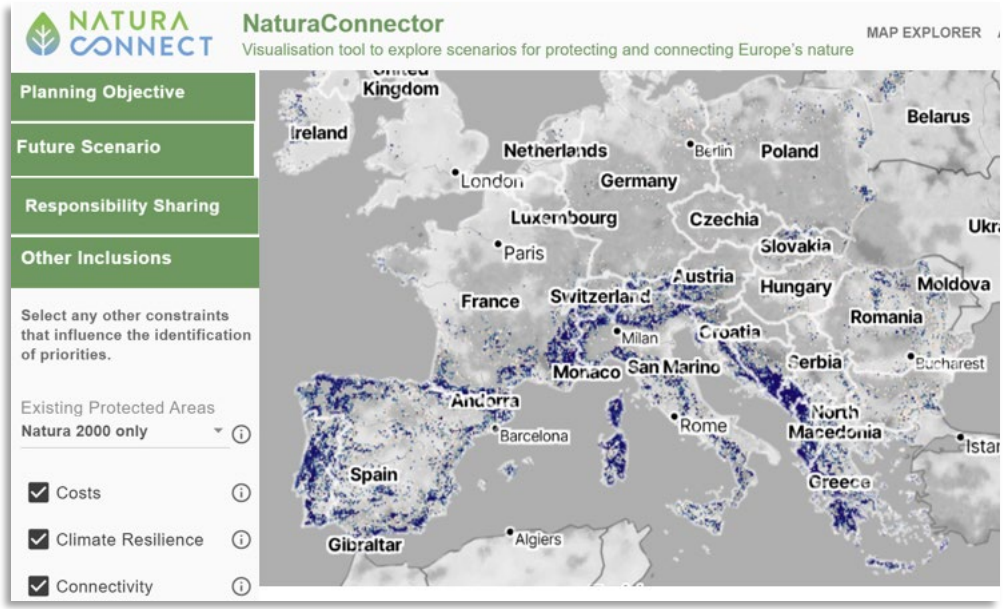
PriorityCheck

Check top priority areas



NaturaConnector

Navigate and explore all variant scenarios



Report: Pan-European Connectivity

- Terrestrial Vertebrate Functional Connectivity
- Structural EUNIS Habitat Connectivity
  - >250 habitat types
- Riparian Connectivity maps
- Structural Freshwater Connectivity
  - New clustered database of water barriers

Project Reports: https://riojournal.com/topical_collection/247/
Search: "**rio collection naturaconnect**"
Data available on Zenodo

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Report: Connectivity Guidelines for Europe

- **Guidelines, data and tools for connectivity conservation** from local to pan-European scales
  - Part 1: Connectivity in Europe: Concepts, policies, & projects
  - Part 2: Tools and a framework for implementation of projects

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