HENRIQUE MIGUEL PEREIRA

German Centre for Integrative Biodiversity Research (iDiv) e Biopolis/INBIO

RESULTADOS DO PROJETO NATURACONNECT NA EUROPA

NATURA CONNECT

UNIVERSIDADE DE ÉVORA

Cátedra Rui Nabeiro biodiversidade

Funded by the European Union

From Natura 2000 to a Trans-European Nature Network (TEN-N)

NaturaConnect Team

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Funded by the European Union

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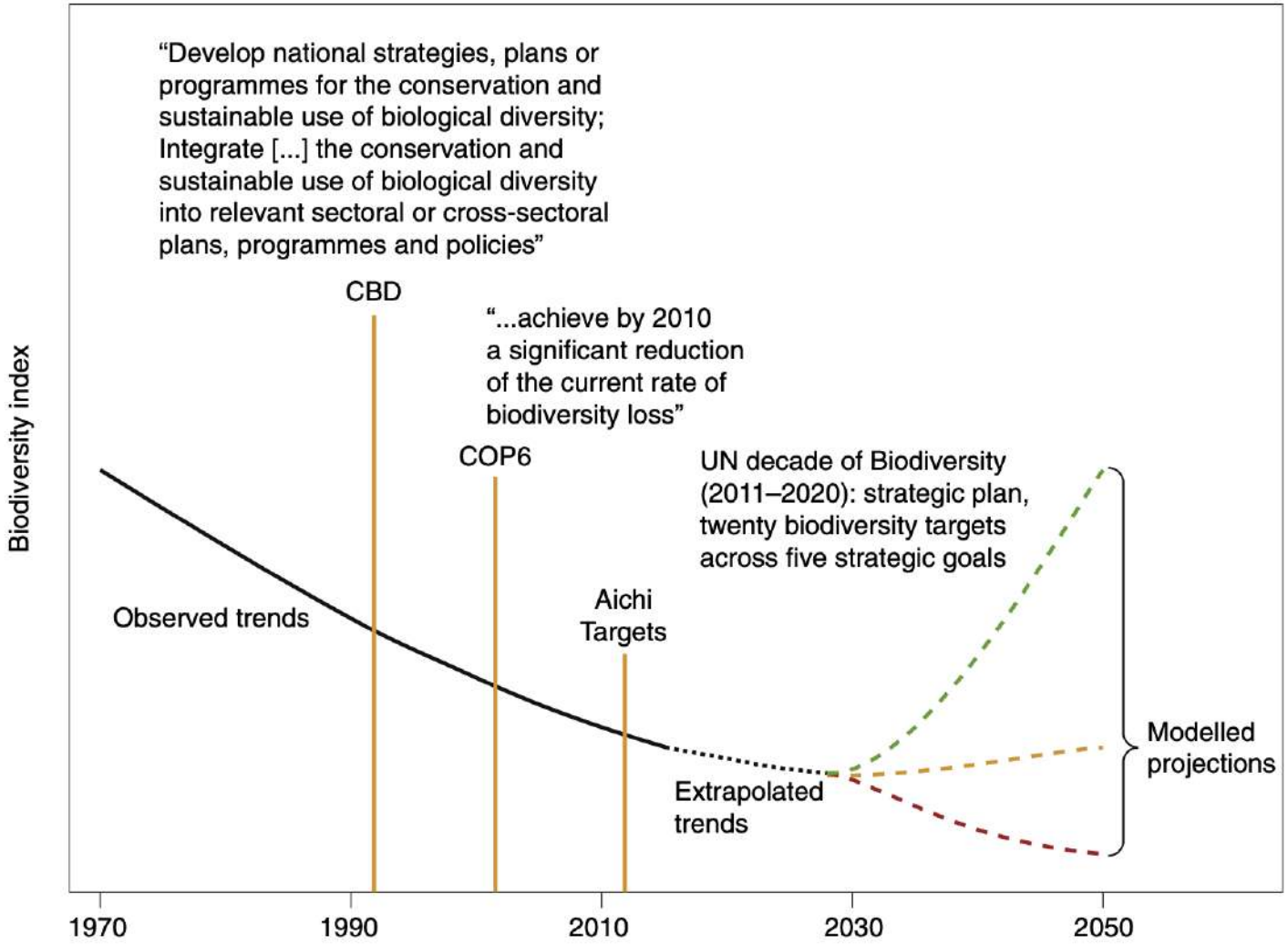
22 May 2026

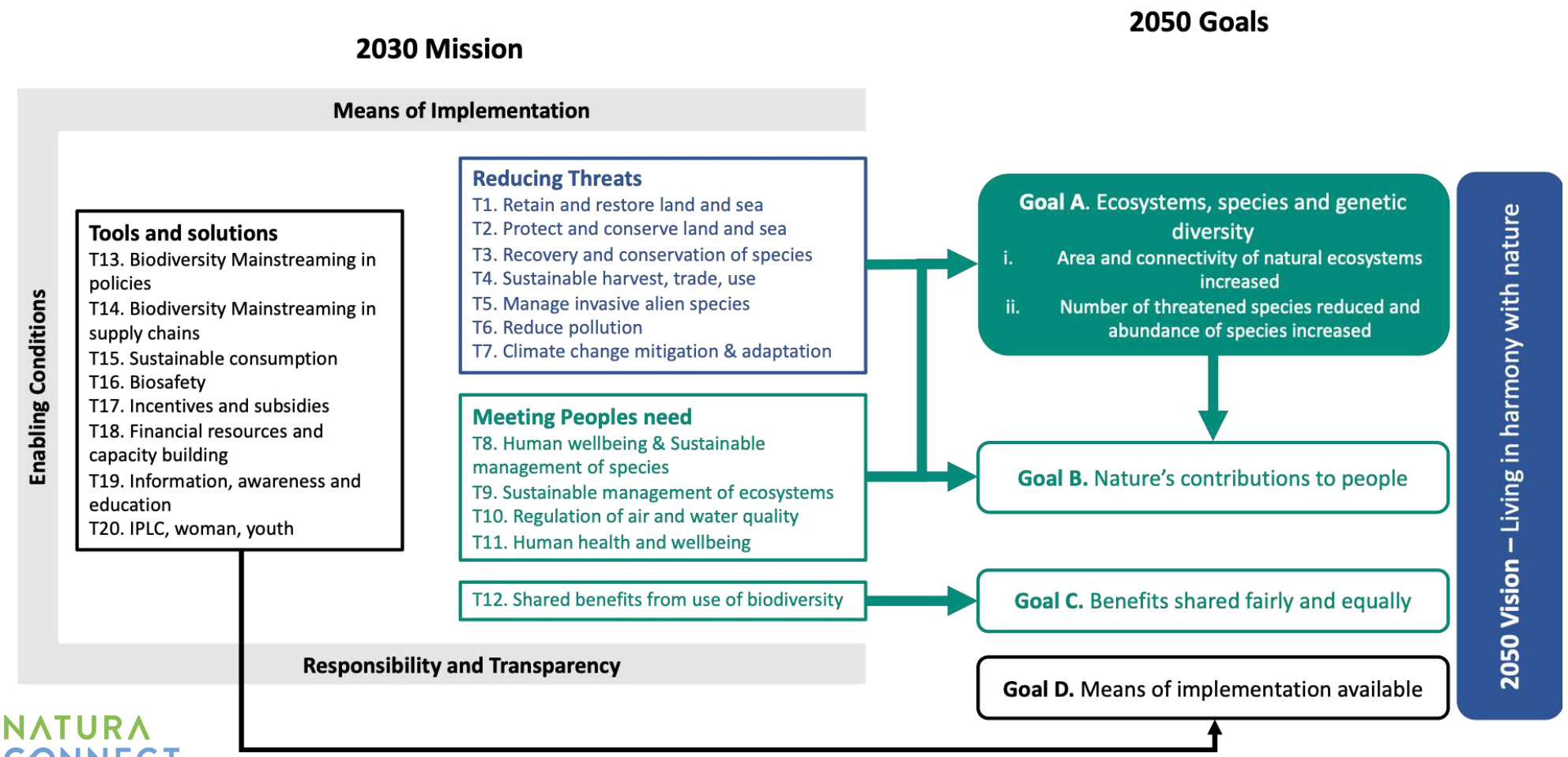
The need for ambitious biodiversity goals



Mace et al 2018 Nat Sust

New ambitious targets:
Kunming Montreal Global Biodiversity Framework

Convention on Biological Diversity



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The European Biodiversity Strategy 2030

Legally protect at least 30% of the land.
At least **1/3 strictly protected**

Implement **restoration measures on 20%** of land (Nature Restoration Regulation)

Setup **ecological corridors** to prevent genetic isolation, allow for species migration, and maintain and enhance healthy ecosystems.

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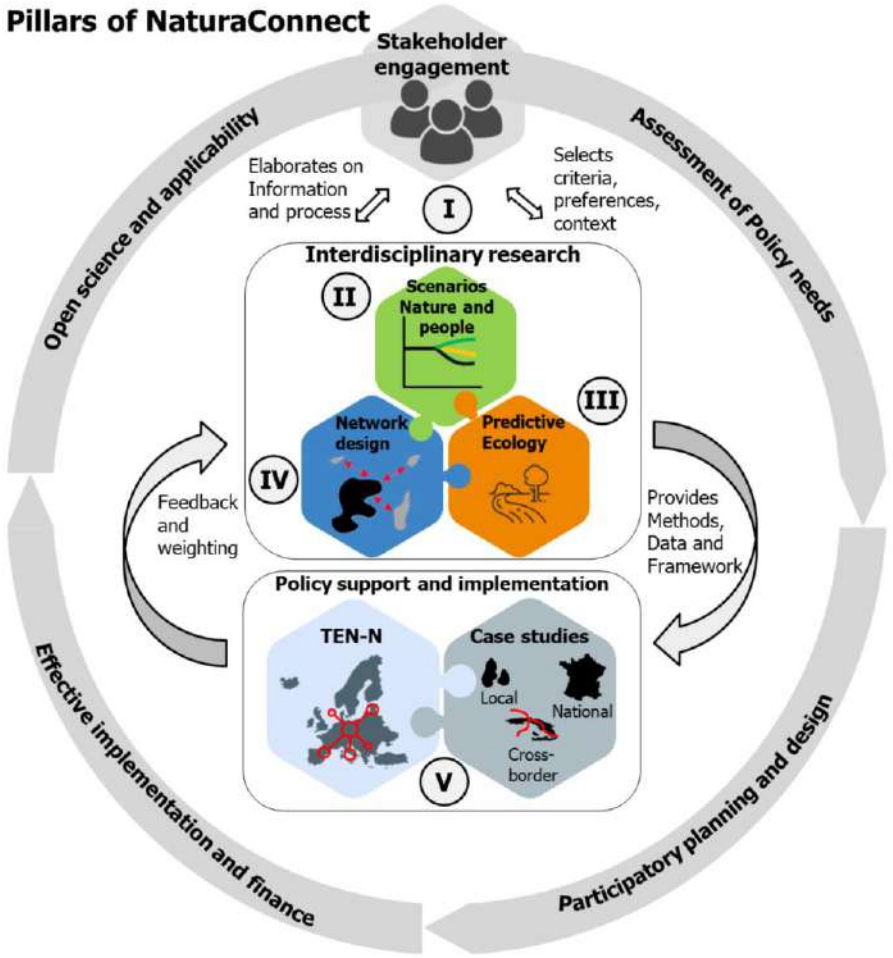
Supporting the development of a coherent and resilient Trans-European Nature Network

HORIZON-CL6-2021-BIODIV-01-08

- Contributing to the implementation of the EU biodiversity strategy for 2030, this topic aims to give support to building a coherent and resilient trans-European nature network (TEN-N) of **protected areas**, including through the set-up of **ecological corridors**, thereby contributing to the protection and restoration of ecosystems and their services in Europe.

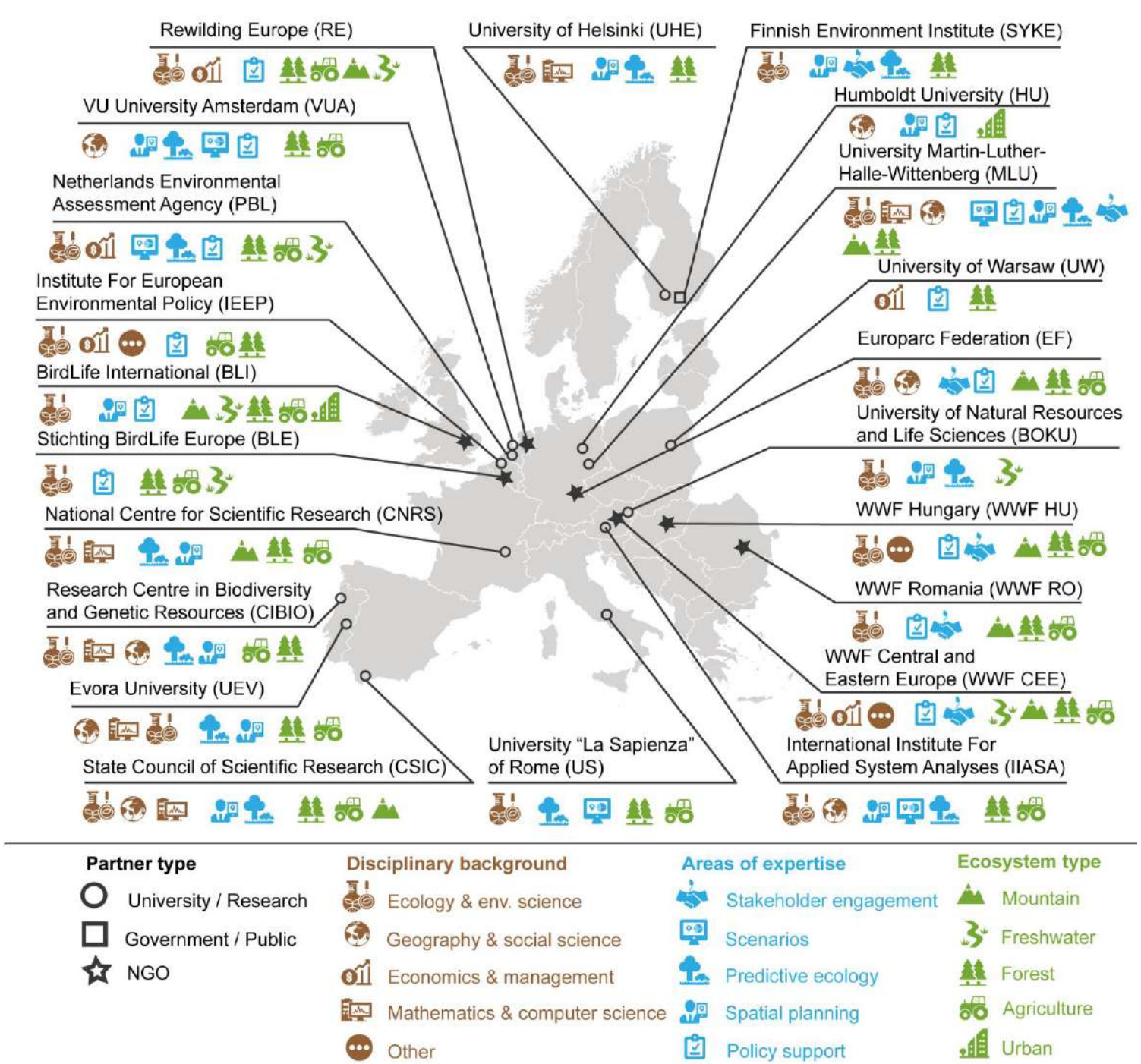


NaturaConnect Consortium

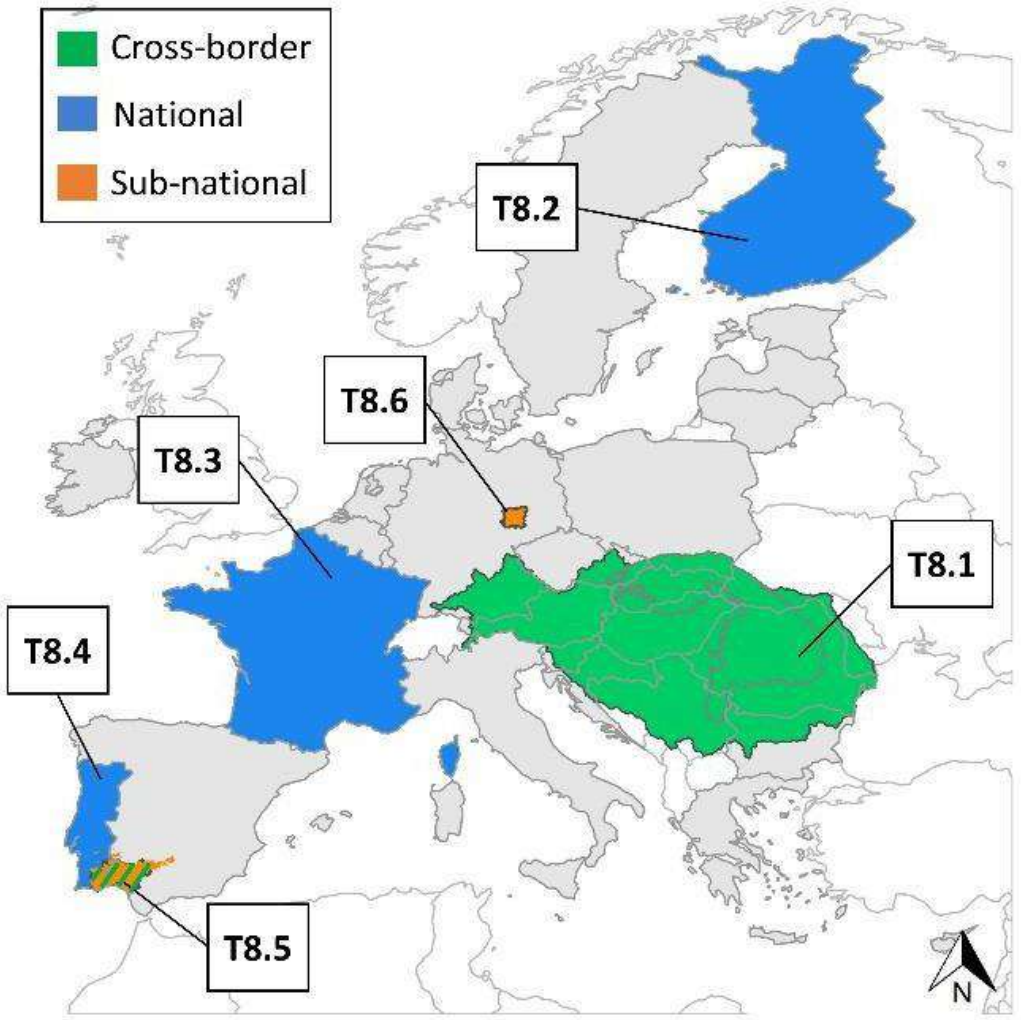
22 Partners

15 Research organisations

7 National agencies & conservation NGOs



Multi-scale approach



T8.1 Cross-border region: Carpathians and Danube Basin (**WWF CEE**, WWF RO, WWF HU, SBE, M3-M48)

T8.2 National level: Finland (**UHE**, SYKE, M3-M48).

T8.3 National level: France (**CNRS**, M3-M48).

T8.4 National level: Portugal (**UEV**, M3-M48).

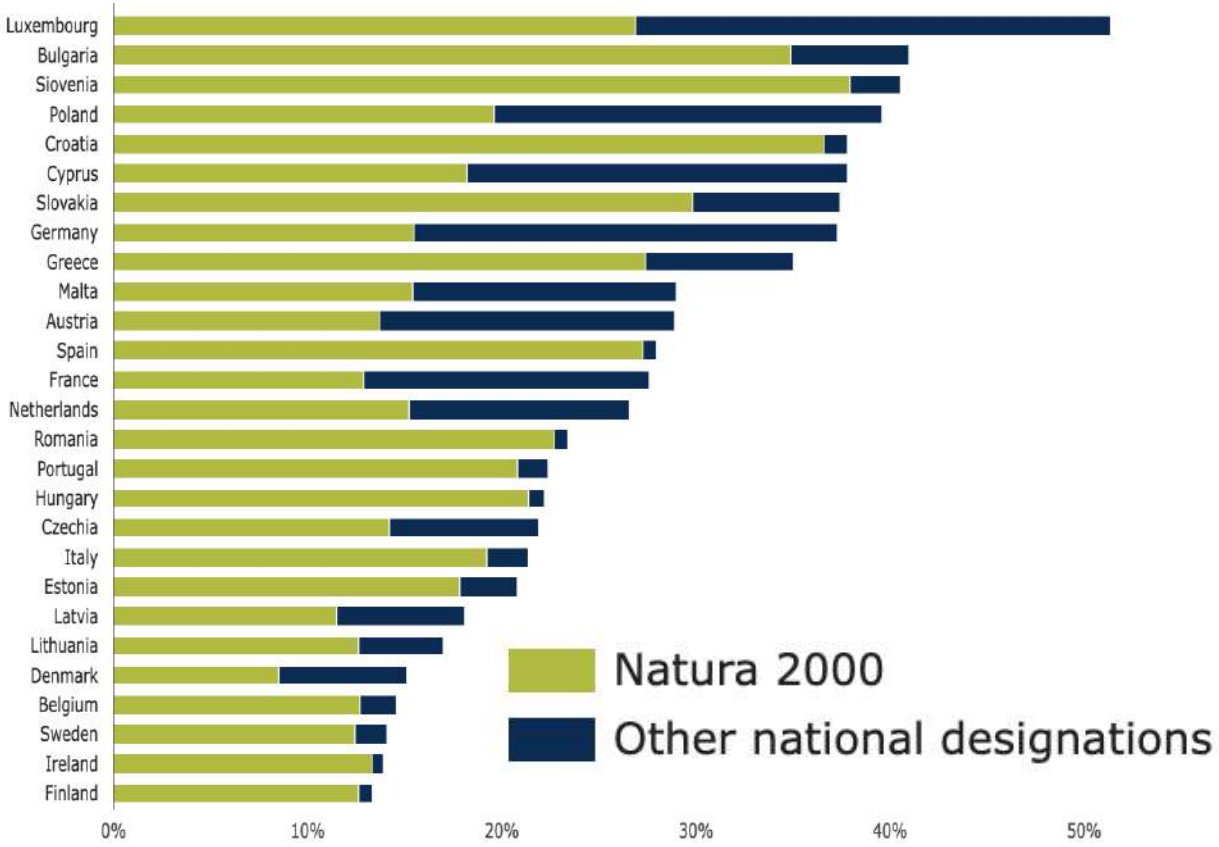
T8.5 Sub-national level: Doñana area (**CSIC**, M3-M48).

T8.6 Sub-national urban level: Halle-Leipzig (**HUB**, M3-M48).

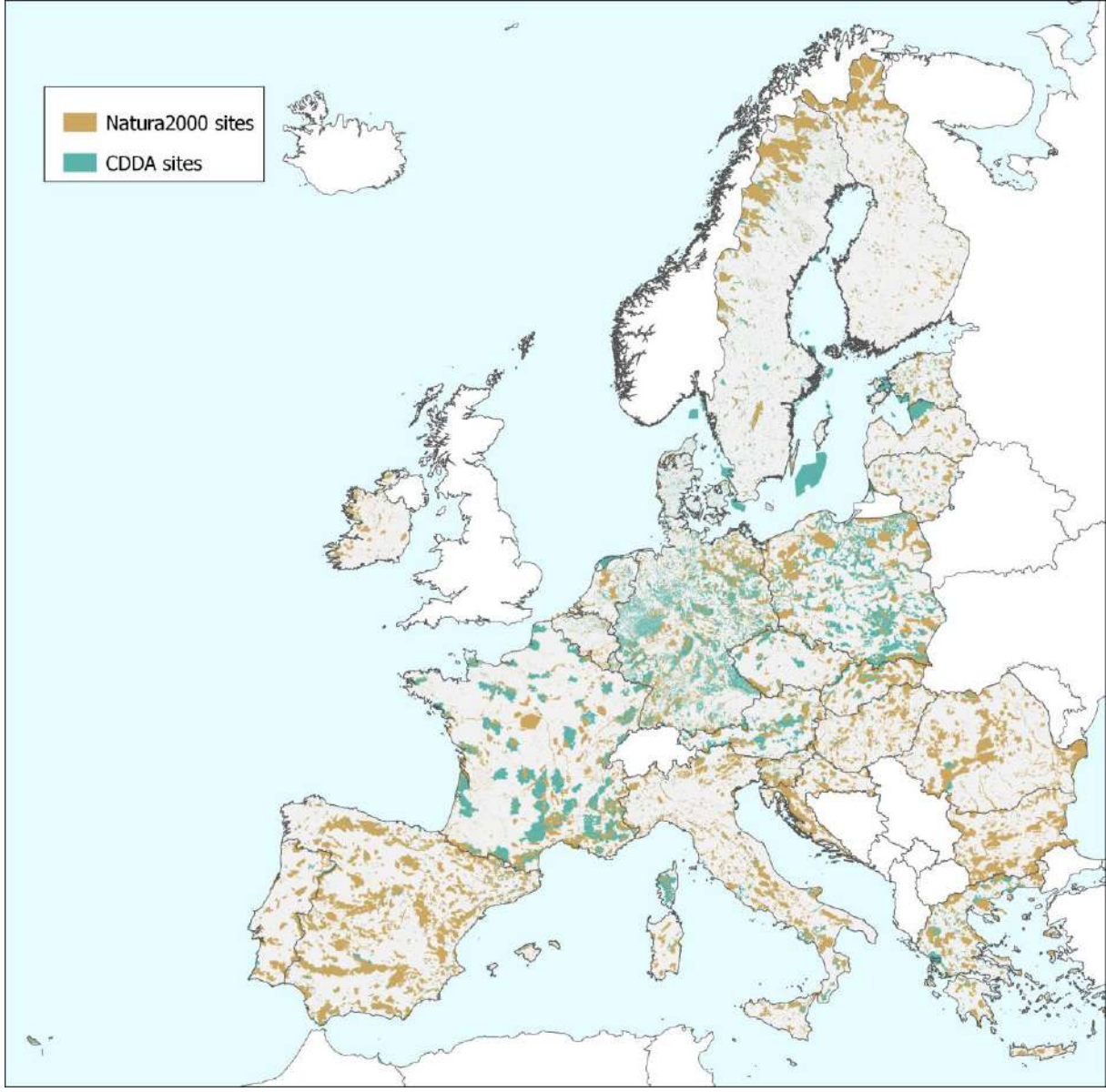
iDiv

Where to protect, restore and sustainably manage ecosystems in Europe?

The current Protected Area Network



Fraction of the country protected



Source: EEA 2025

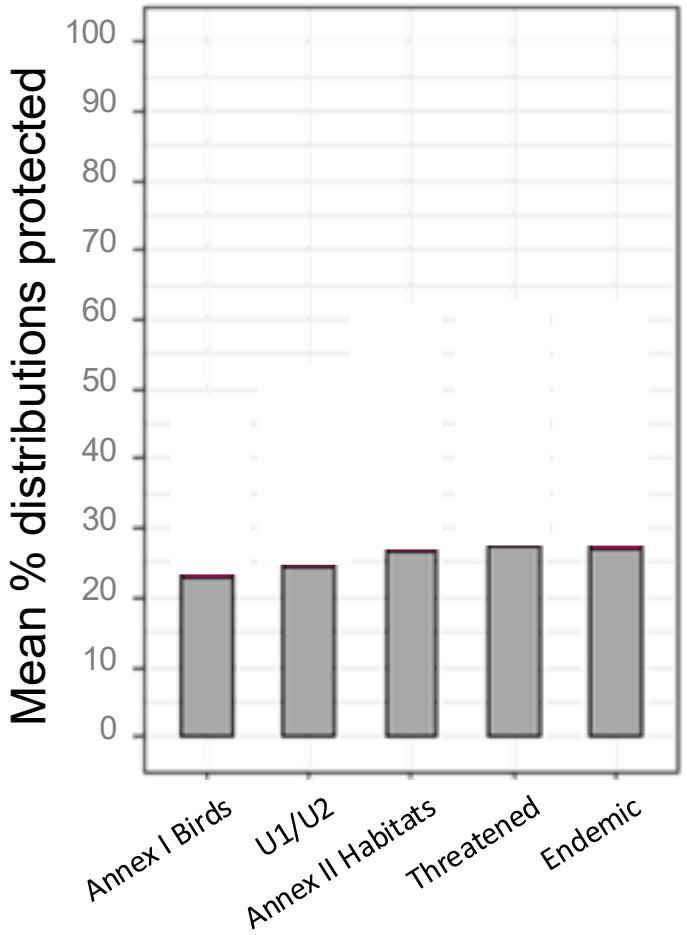
Comprehensiveness of the EU PA network

Disaggregation across species and using suitable habitat within range

U1= Unfavourable bad

U2 Unfavourable inadequate

Conservation status in the current Nature Directives reporting period at European Level



There are large gaps in protection for several habitats and species


Gladiolus palustris © Boris Mittermier


Dobrogean beech forests © Matthias Schickhofer

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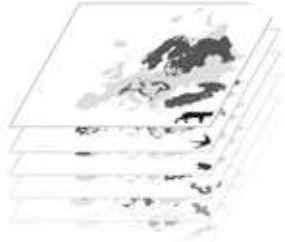
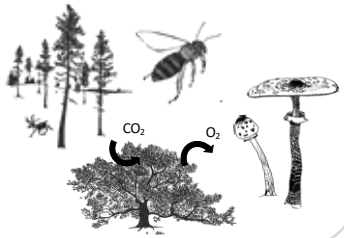
Where to protect, restore and sustainably manage ecosystems in Europe?

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

Species & habitats distributions

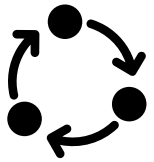


Ecosystem services



Climate change

Connectivity

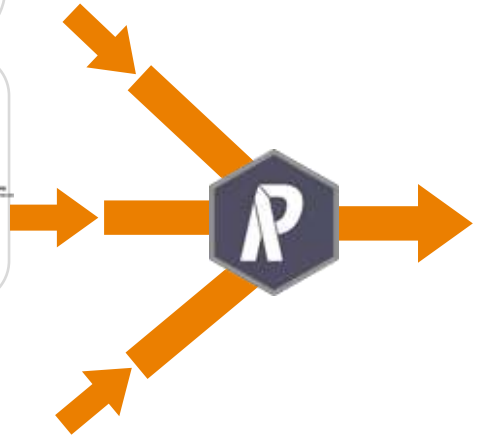


Land use change scen

Costs

Burden sharing

Protected areas



Top priority areas for:

30% protected areas

10% strict protection

20% restoration

Green infrastructure

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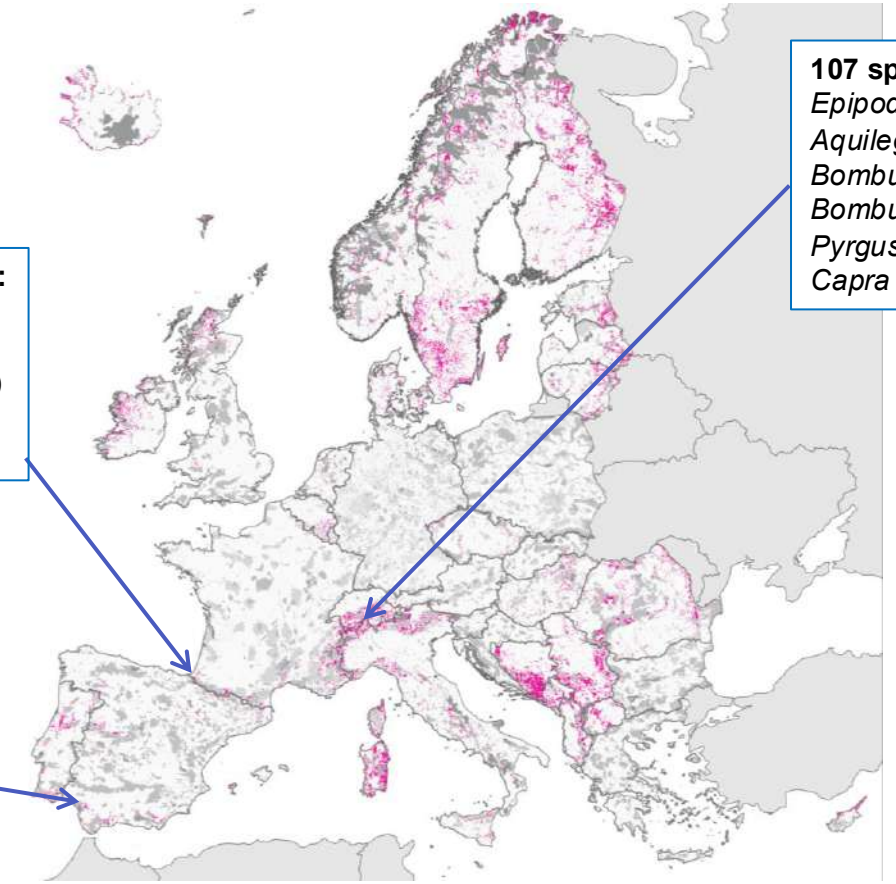
Priorities for protected area expansion

30% per country with coordinated planning at the European level

128 species/km², including:
Soldanella villosa
Galemys pyrenaicus (EN)
Neophron percnopterus (EN)
Triturus marmoratus (VU)
Gyps fulvus

93 species/km², including:
Apus affinis
Marmaronetta angustirostris (NT)
Lynx pardinus (VU)



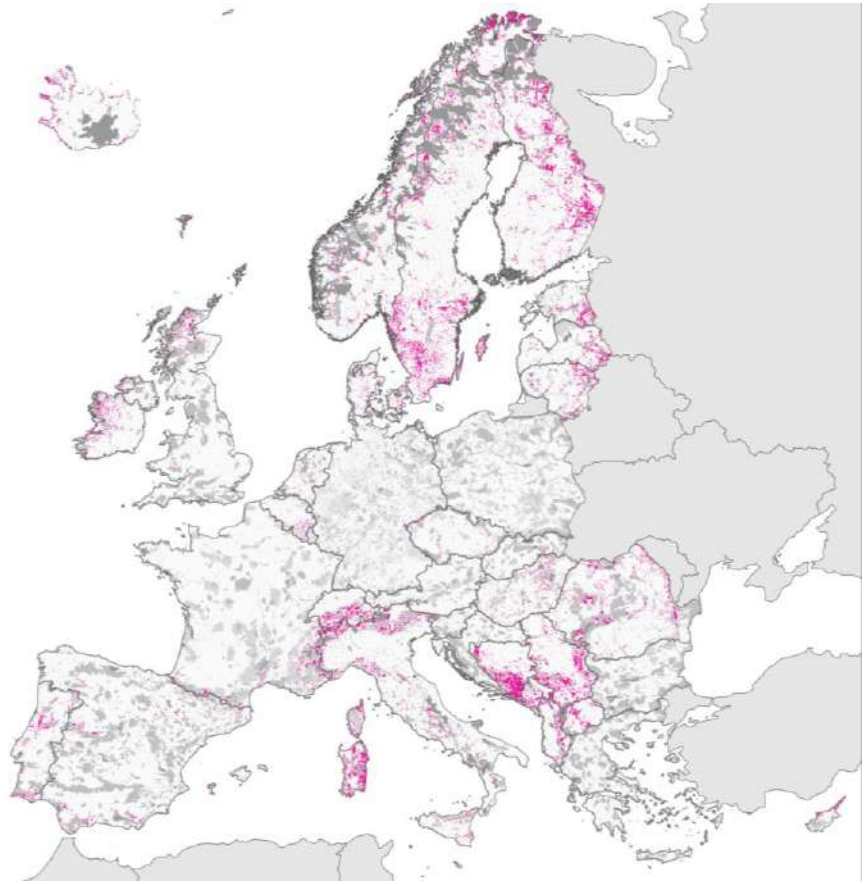
107 species/km², including:
Epipodisma pedemontana (NT)
Aquilegia alpina
Bombus gerstaeckeri (VU)
Bombus mucidus (NT)
Pyrgus cacaliae
Capra ibex

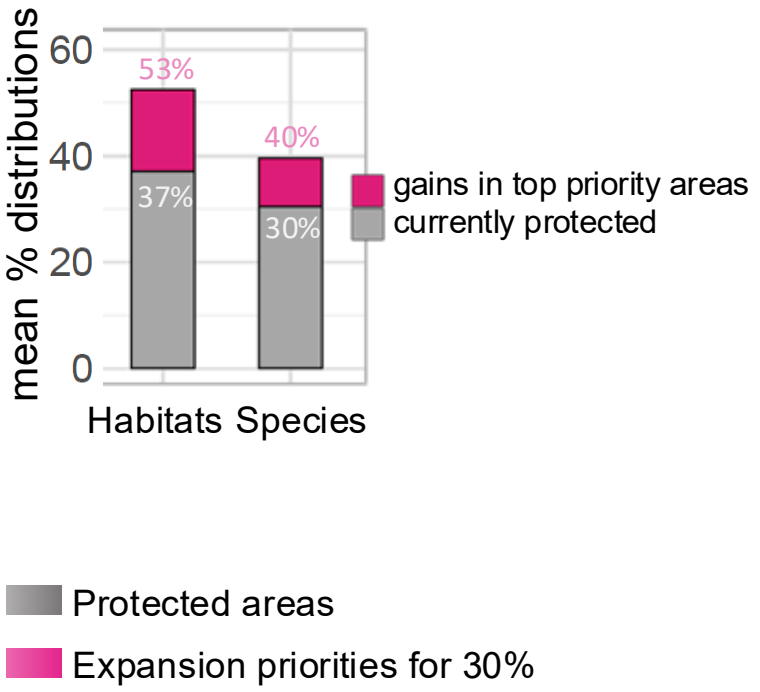
Priority areas minimize gaps in coverage for **species and habitats**, are complementary and expand on existing protected areas. Here, we also consider **climate change** driven range shifts and ecological **connectivity**.

Priorities for protected area expansion

30% per country with coordinated planning at the European level

Just 5% of additional area **in the right places** can lead to **large gains** for species and habitats.





Priority areas minimize gaps in coverage for **species and habitats**, are complementary and expand on existing protected areas. Here, we also consider **climate change** driven range shifts and ecological **connectivity**.

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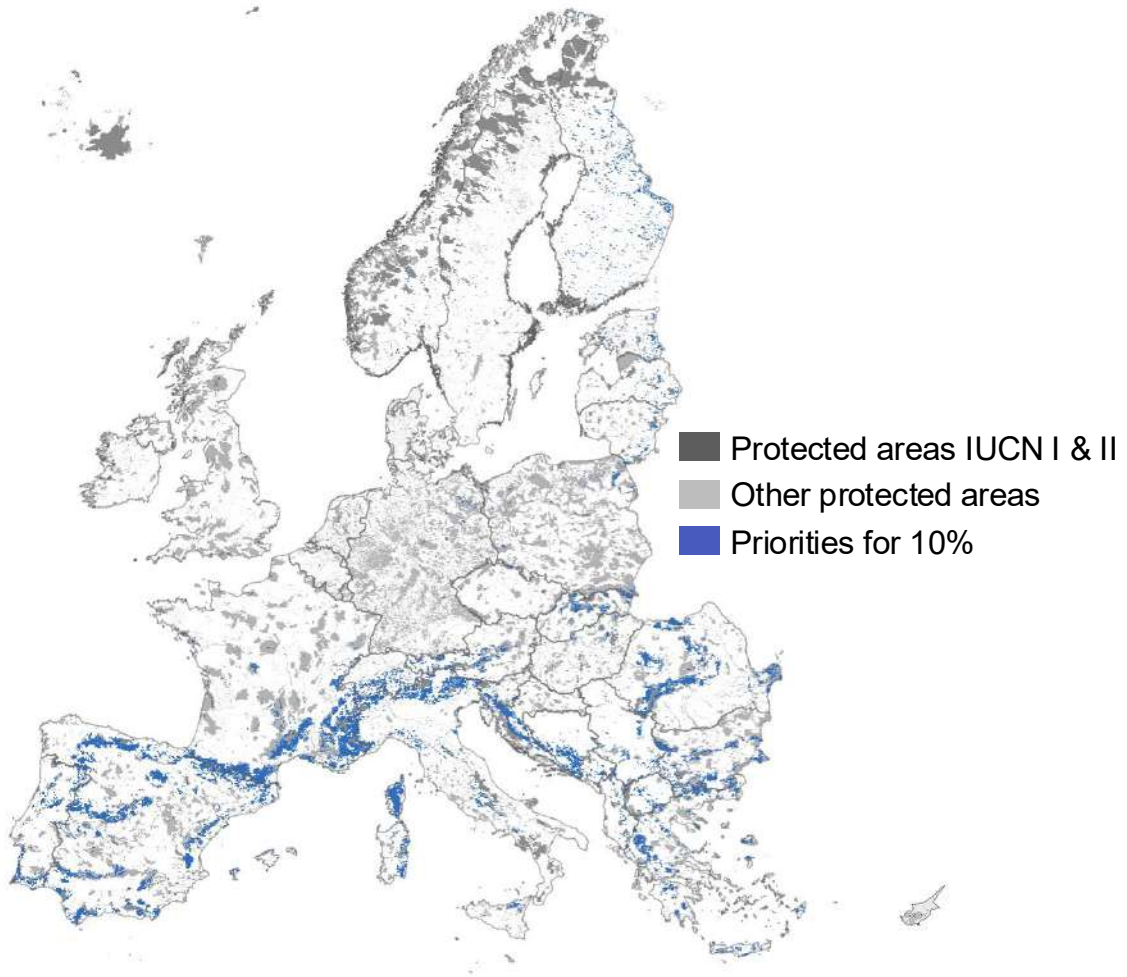
Priorities for 10% strict protection

What criteria for the 10%?

1. Top **priorities expand on reserves and national parks (IUCN I and II)**, which we use as baseline for strict protection
2. 10% are nested within the 30%, and include **upgrading** of non-strict protected areas, with a core & buffer spatial structure when possible
3. The 10% are the areas with the **highest biodiversity value** for species and habitats, including carbon-rich ecosystems (peatlands, old-growth forests), and areas of high ecological integrity.



This is one of many options for defining priorities for strict protection.

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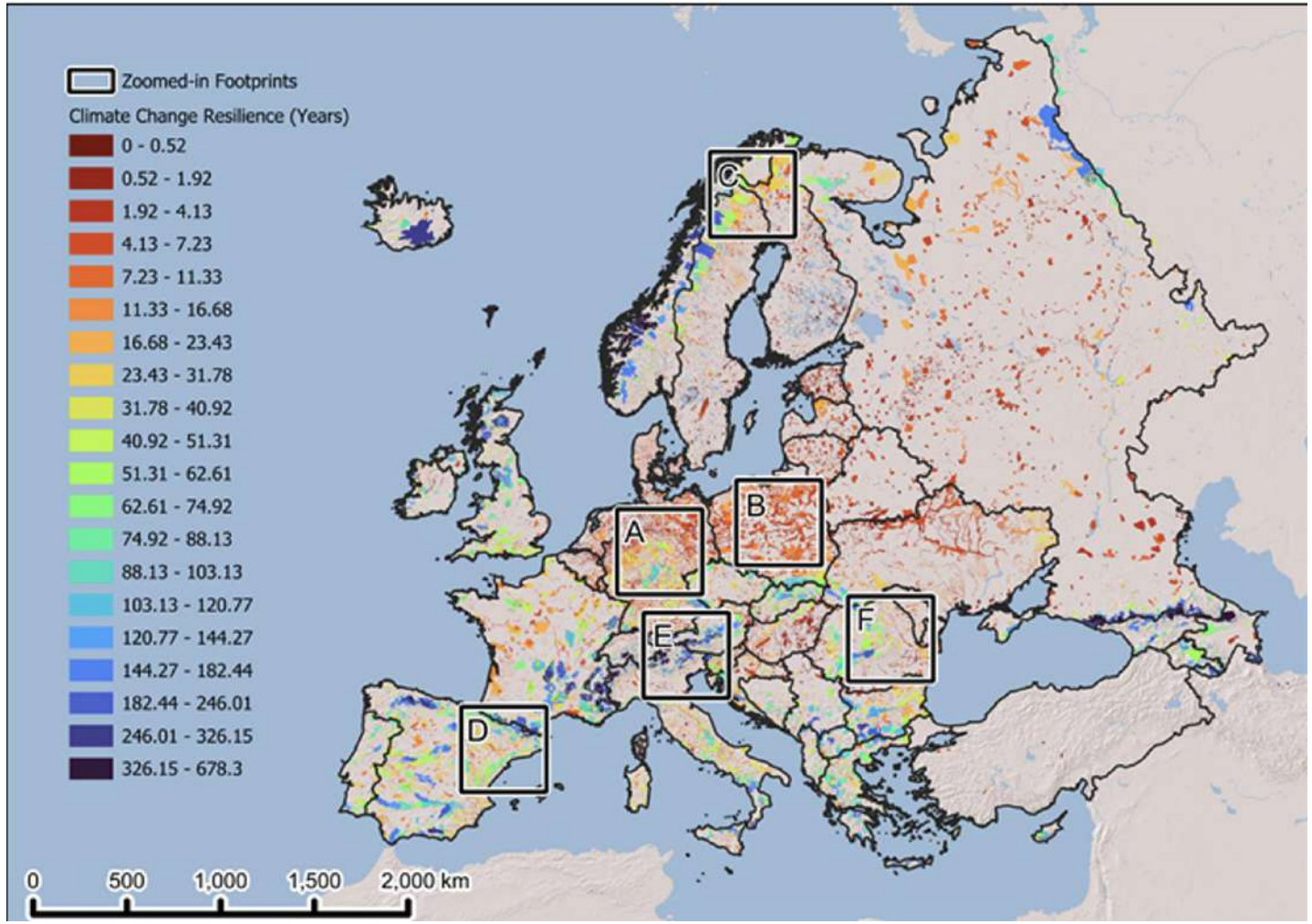
Planning for the future with scenarios



Current protected areas have very low resilience to climate change or changes in land use policies and conservation values.

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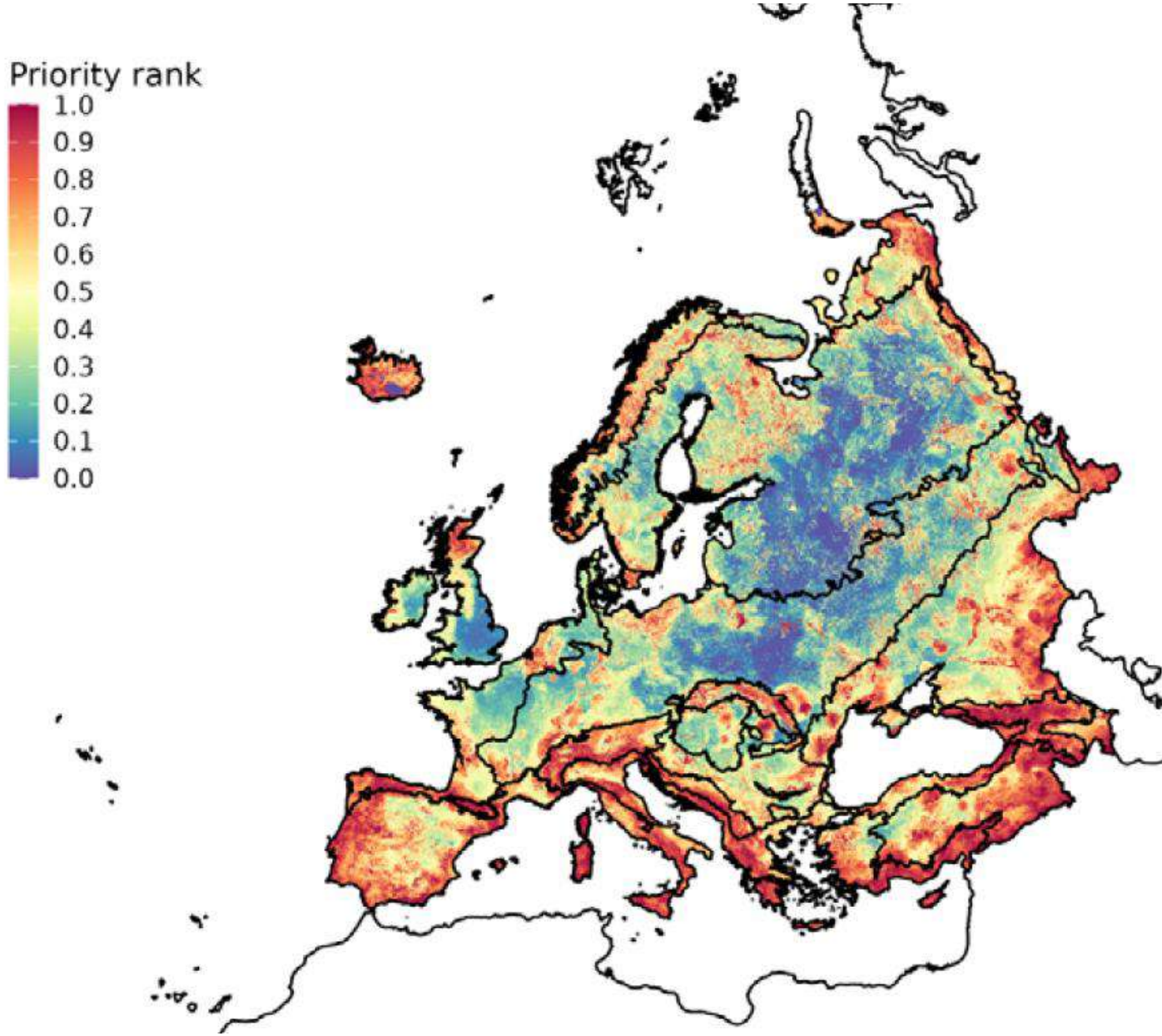
Increasing resilience to climate change

- **52% of the most important areas to facilitate climate adaptation protected** with targeted expansion compared to 33% of present day PAs
- In average **43% of plants, vertebrates and invertebrates future suitable habitat protected with targeted expansion** (30% of Europe), increasing from 32% today (25% of Europe protected)



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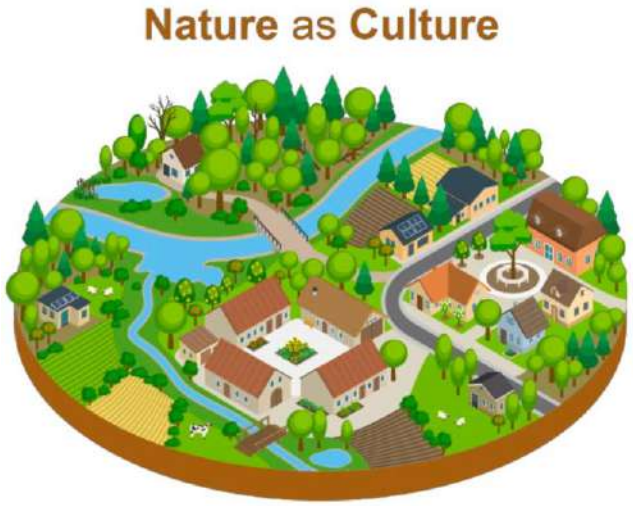
Land use scenarios for the future



NfN	NfS	NaC
Ecological corridors connecting natural areas support the conservation of species and complex ecosystems.	Connected ecosystems support NCP.	Agroecological areas are interspersed with hedgerows and natural patches, and Green and Blue Infrastructure
Large-scale recovery (i.e., passive restoration approach) of ecologically complex and self-sustained ecosystems (e.g., through rewilding).	Active restoration measures increase climate change adaptation, mitigation and other NCP.	Active restoration of ecosystems with cultural, educational and historical importance to support traditional uses and recreation (e.g., agroecological landscapes, rivers and wetlands).

How to connect species and ecosystems across Europe?

Connectivity is critical to TEN-N

The persistence of species and habitats depends on the movement of individuals and gene flows across antropogenic landscapes

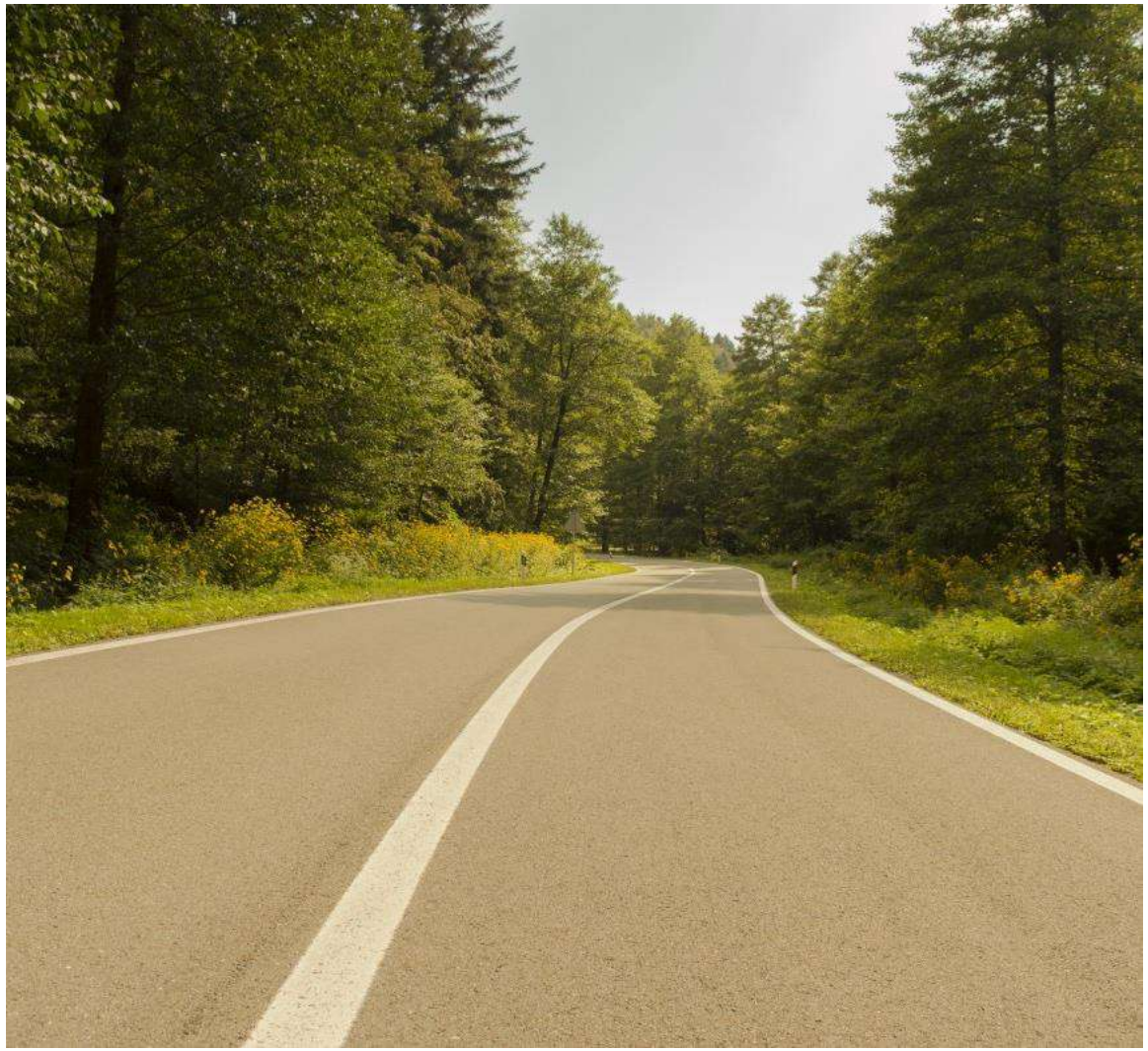
Over 80% protected areas in Europe are smaller than 10 km^2

Climate velocity poses additional pressures on isolated populations and habitats constrained by fragmentation pressures

Photo: Hector Garrido

Different forms of connectivity

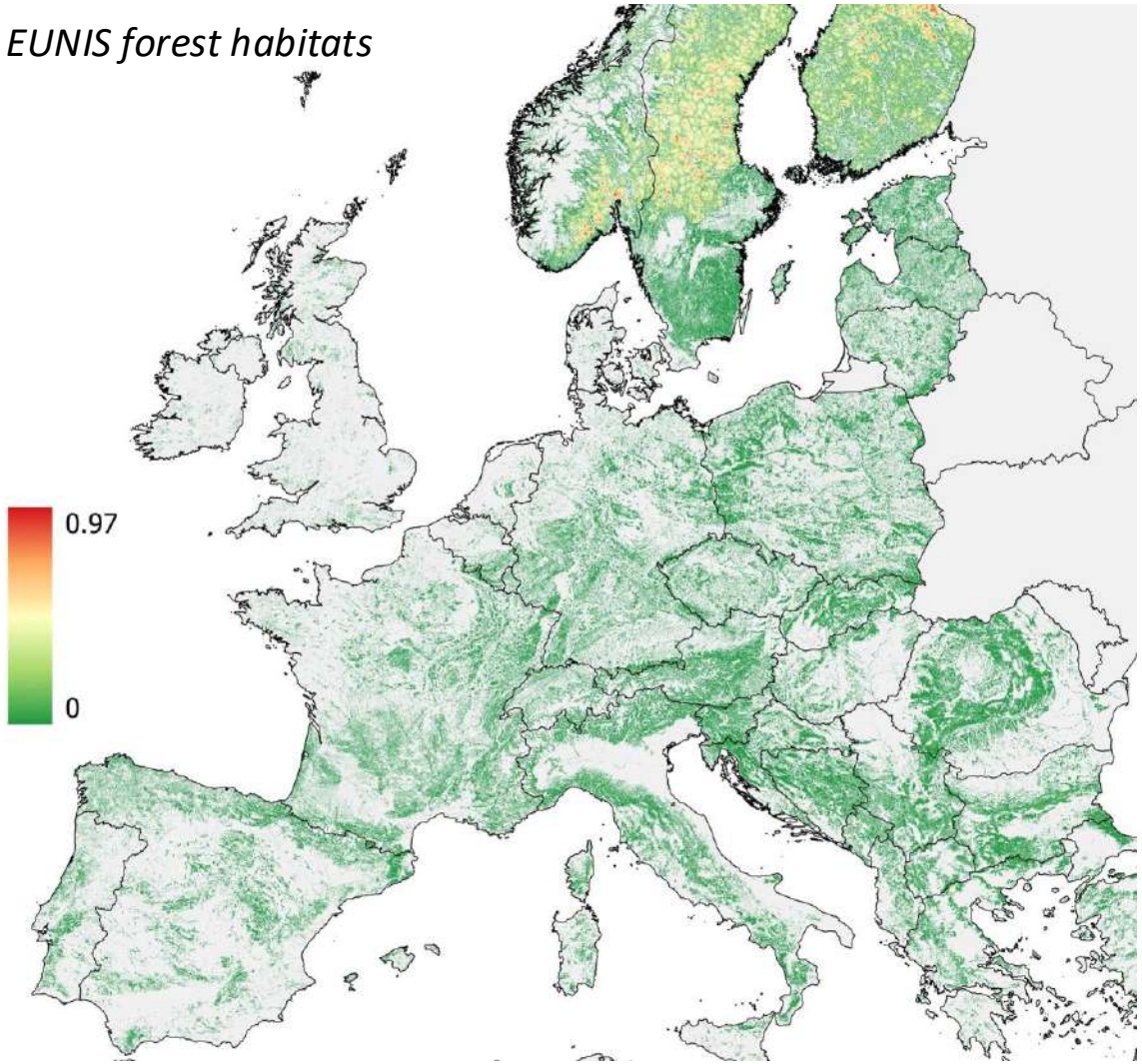
Structural connectivity



Functional connectivity

Different forms of connectivity

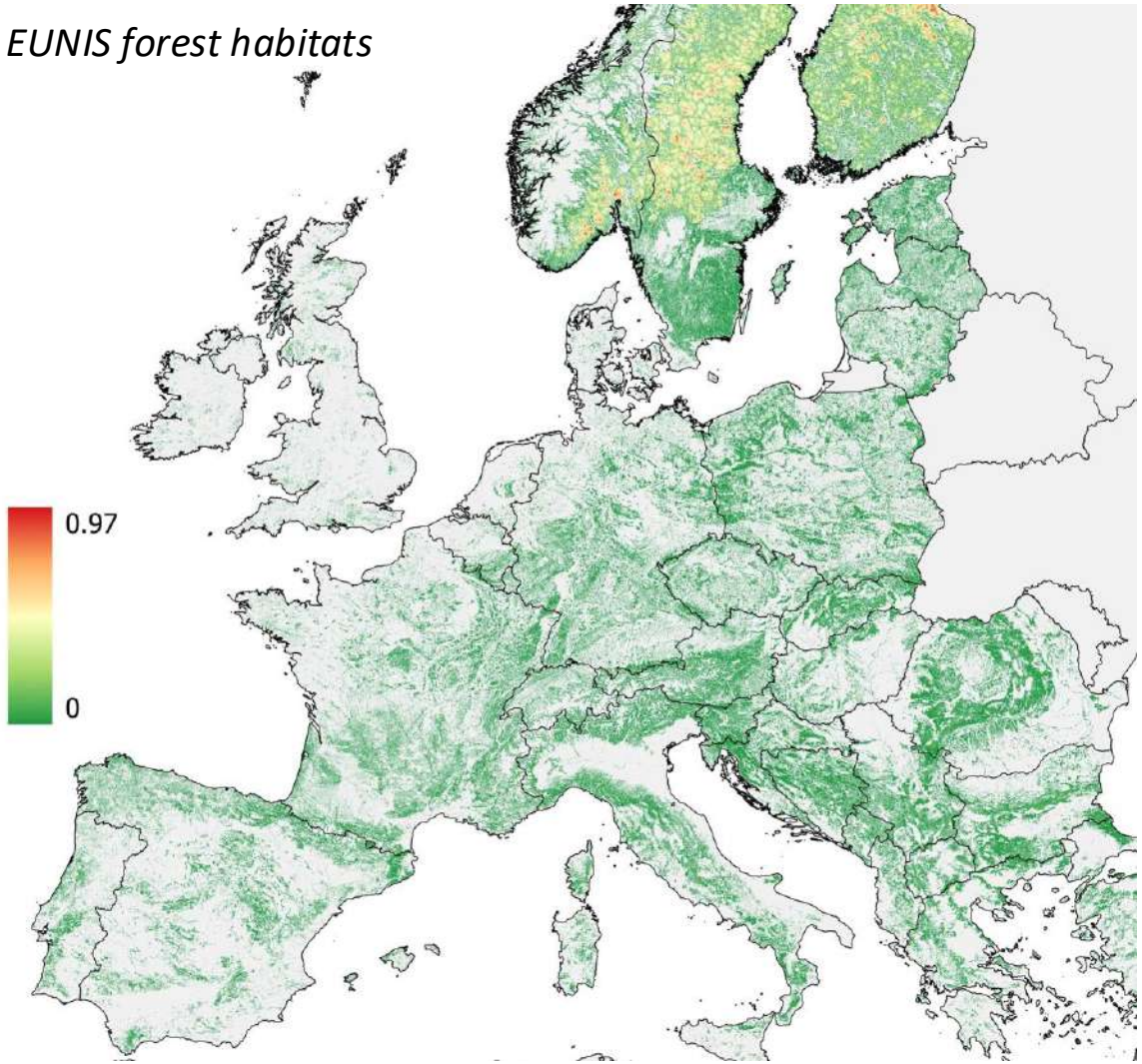
Structural connectivity



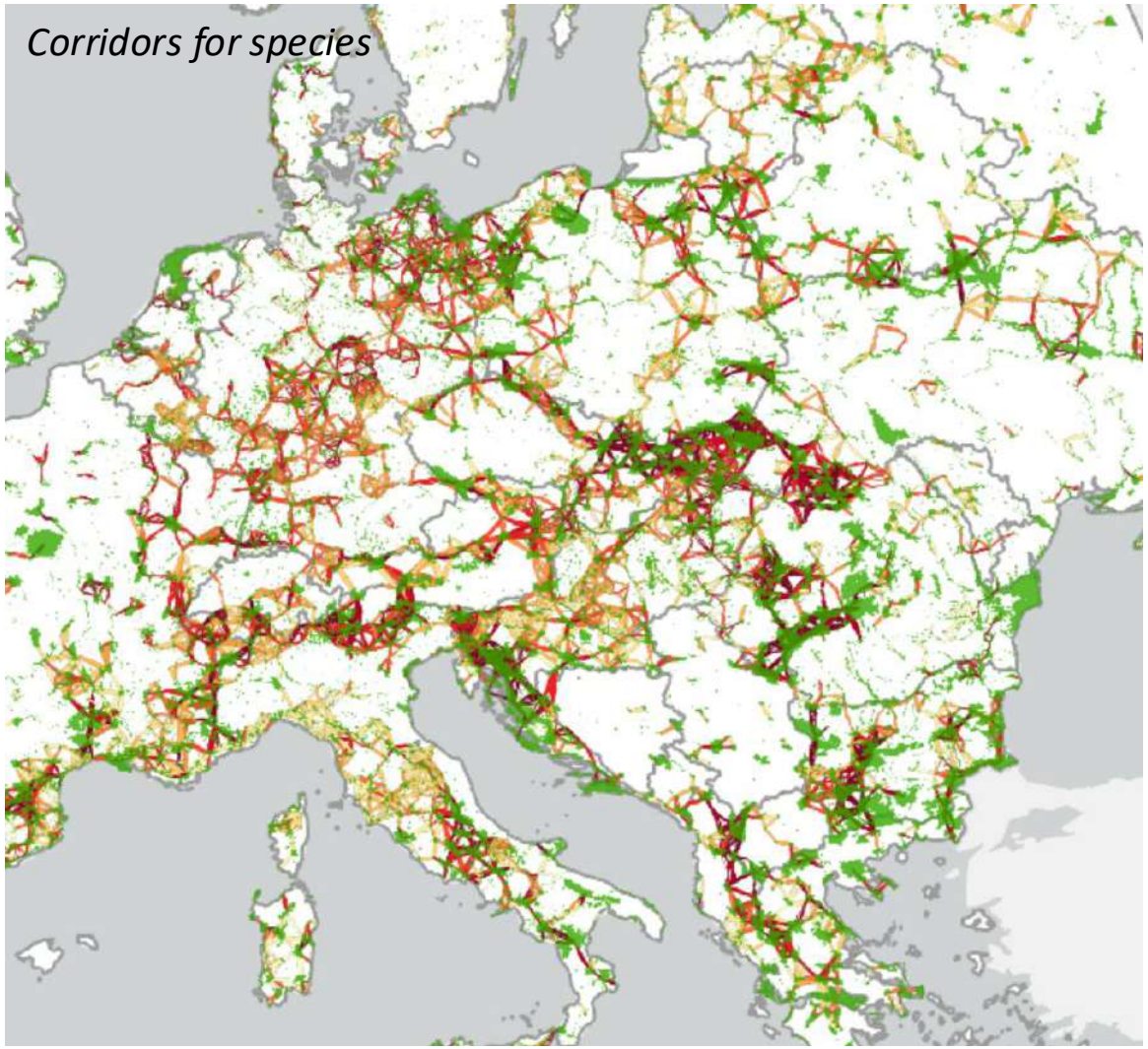
Functional connectivity

Different forms of connectivity

Structural connectivity



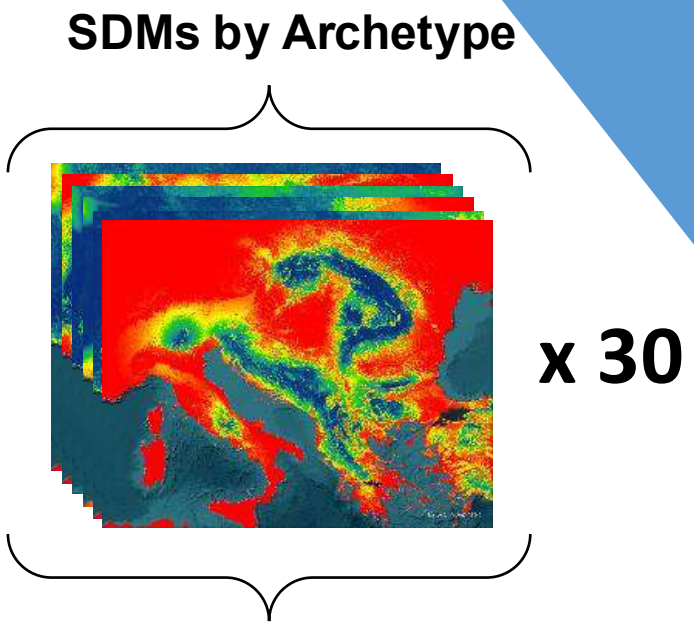
Functional connectivity



Species Archetypes

Developing the Resistance

- Ensemble SDMs for 953 species
- Divided into 30 species archetypes across:
  - Bats
  - Birds
  - Frogs
  - Mammals (non-flying)
  - Snakes
  - Lizards
  - Turtles & tortoises



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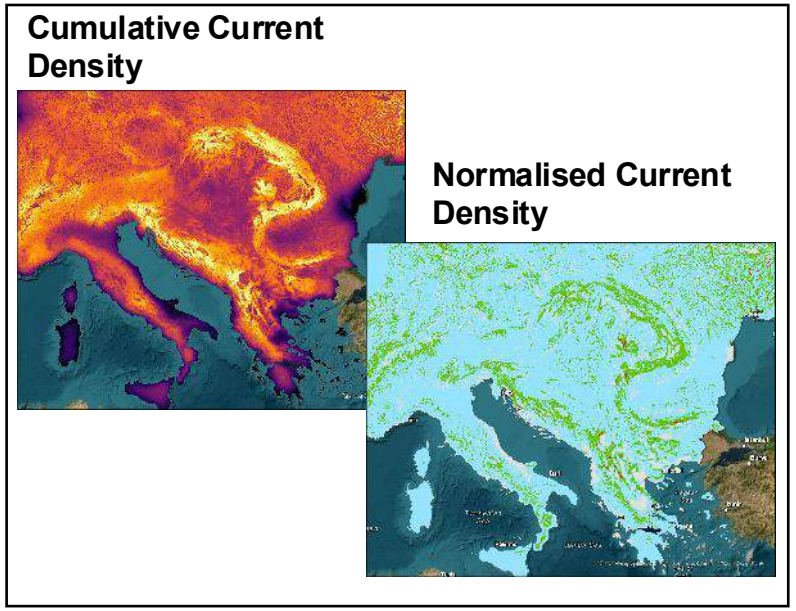
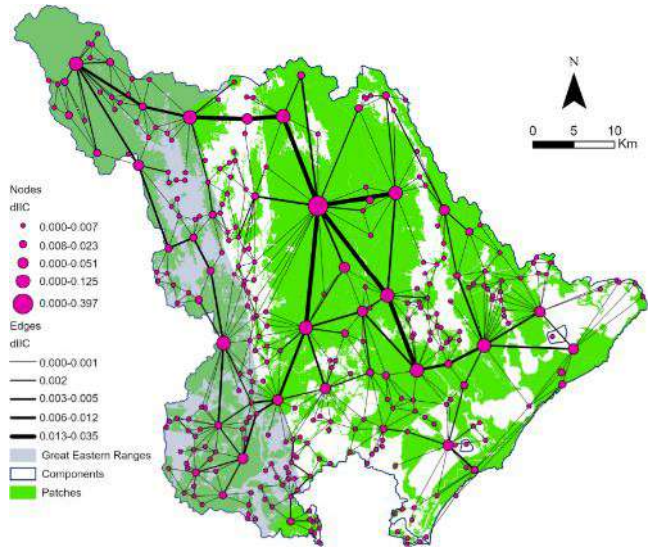
Connectivity Models

Utilization of 3 Methods

- Omnidirectional electrical-circuit connectivity
  - Omniscape moving-window analysis
  - Does not require protected area locations
- Graph-theory Metrics
  - Probability of Connectivity (*dPC*)
  - Used for both nodes & links

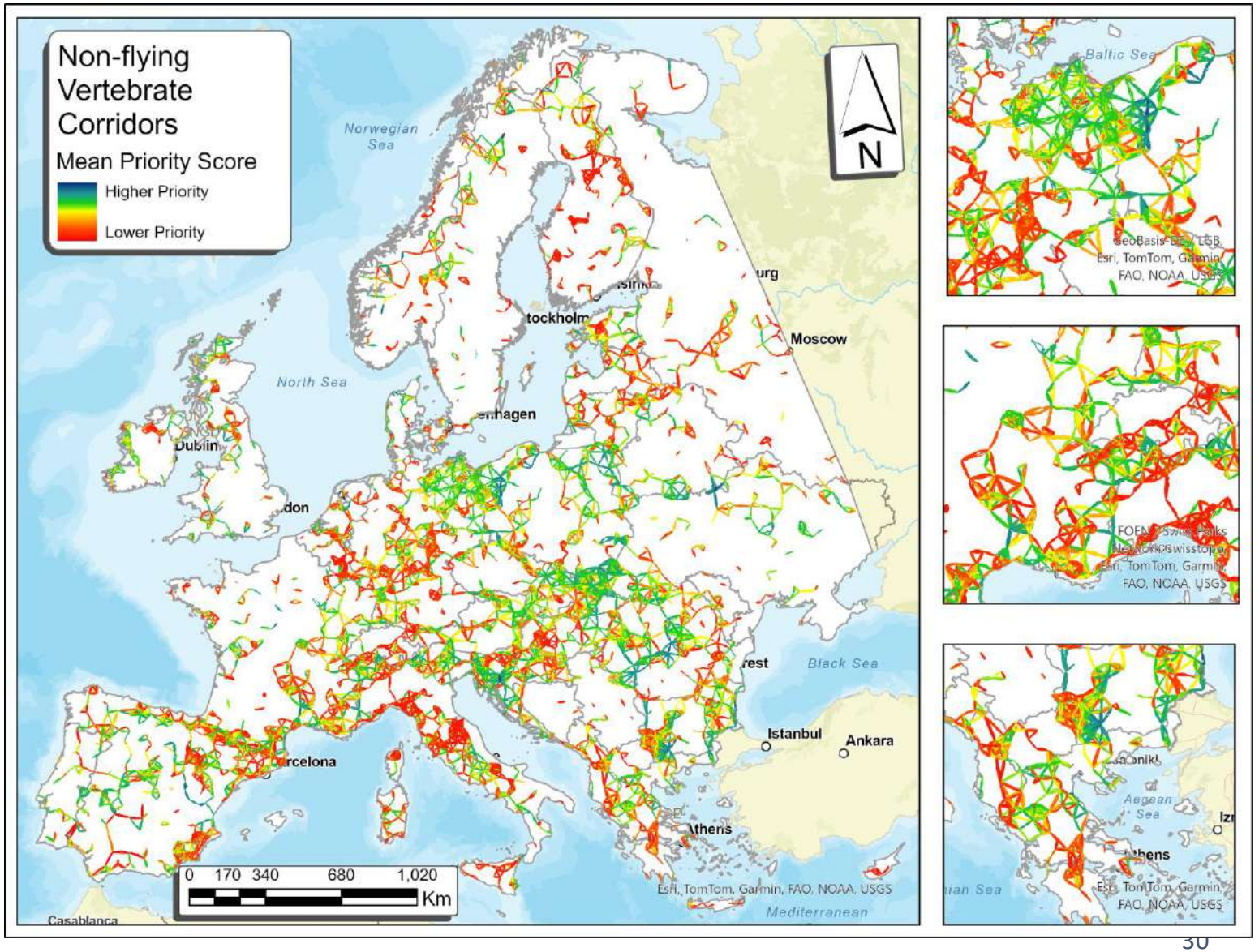




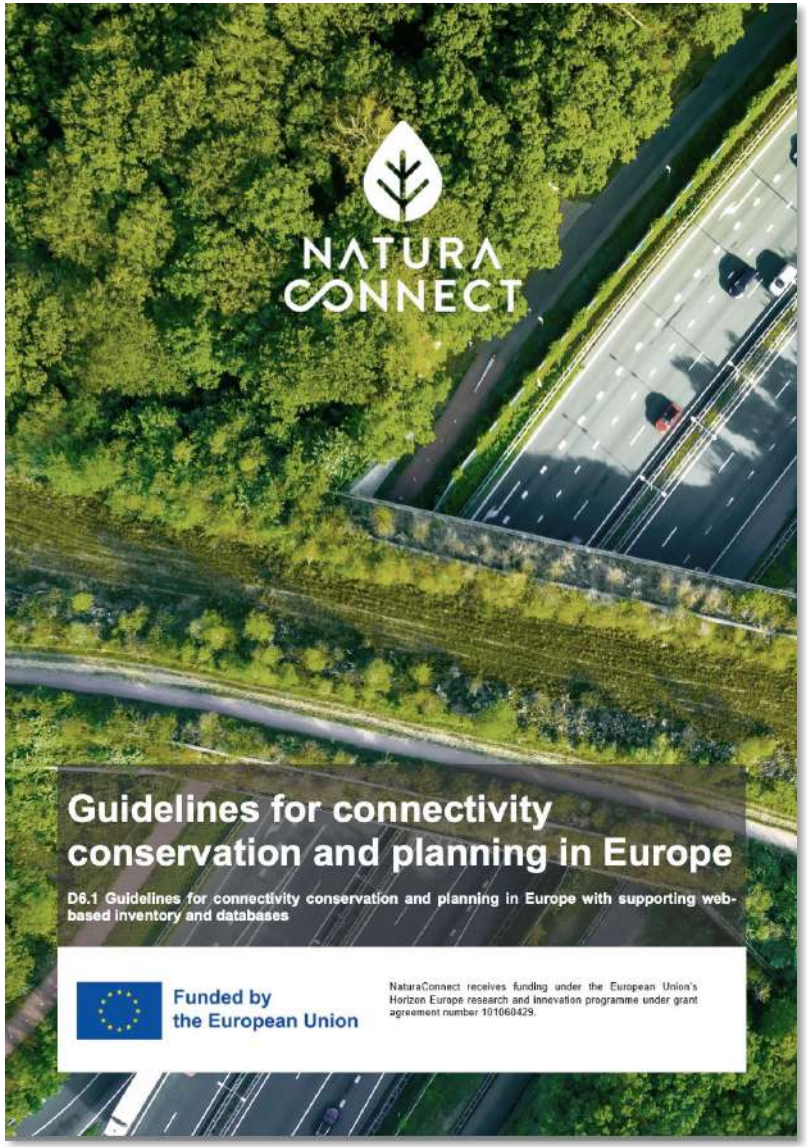
Multi-method Corridor Prioritisation

Prioritization of terrestrial corridors between PAs

- High priority corridors distributed across the continent
- Allow for zooming-in on thousands of individual corridors by species group
  - Prioritize corridors relative to each other
  - Reprioritization can happen at any scale



The NaturaConnect *connectivity blueprints*



Bringing it all together

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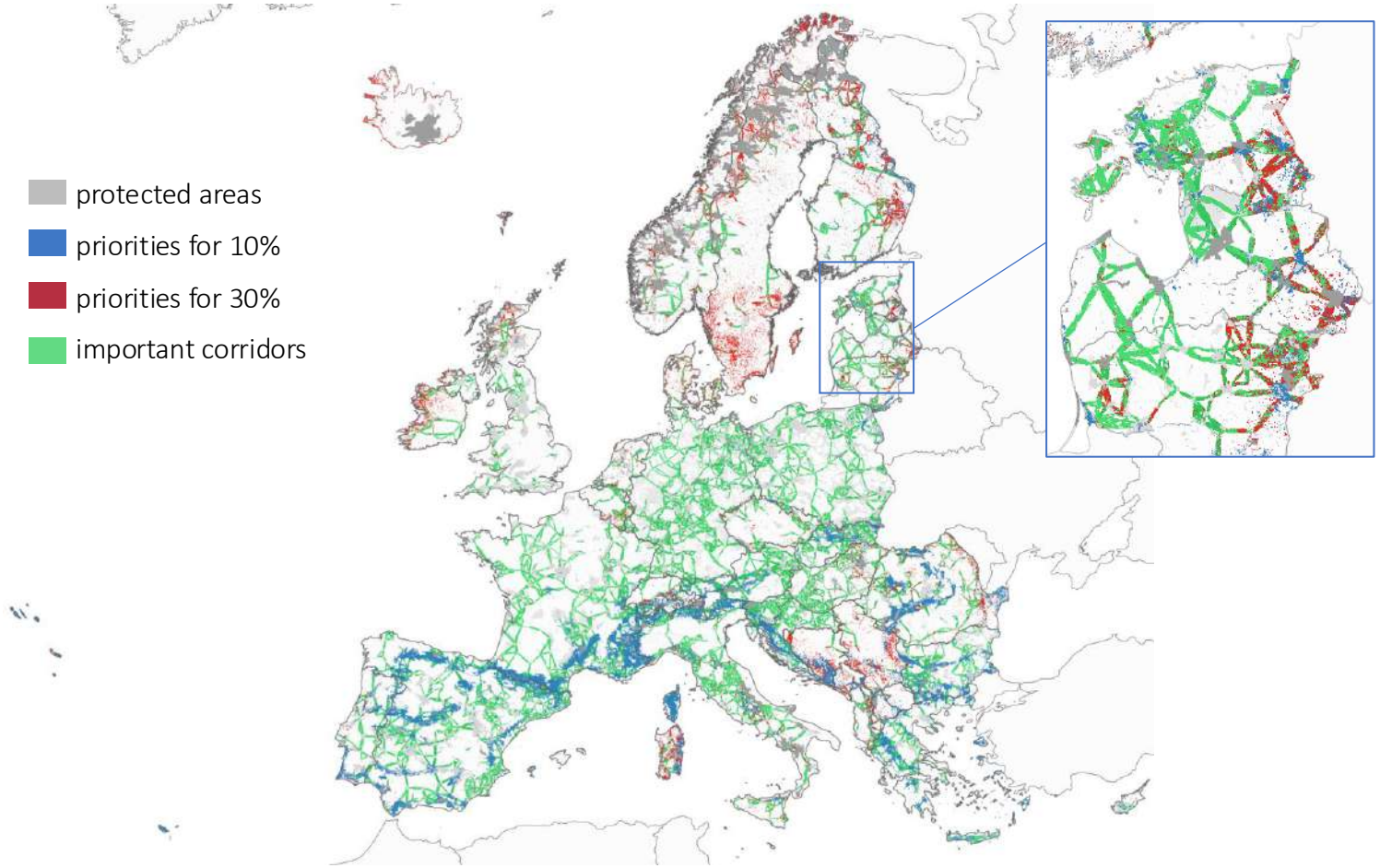
Integrated map for a resilient and connected trans-European nature network (TEN-N)



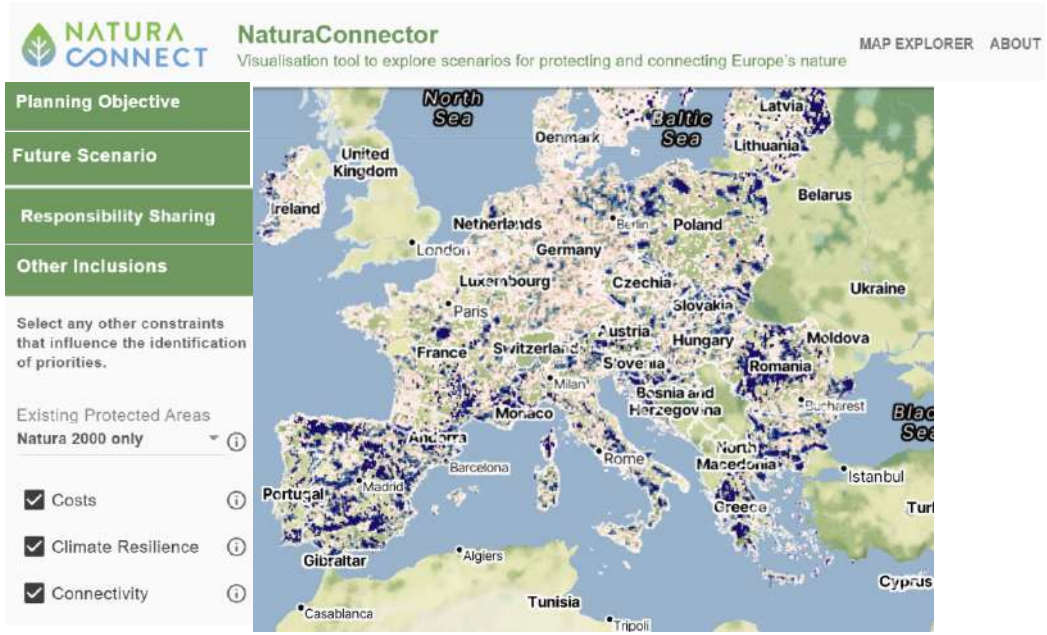
Here, priorities focus on species and habitats, climate change resilience, and ecological connectivity, and conservation areas are distributed evenly between countries.

Provide feedback on the maps: now & later online

We are developing 2 online tools to visualize maps and provide feedback

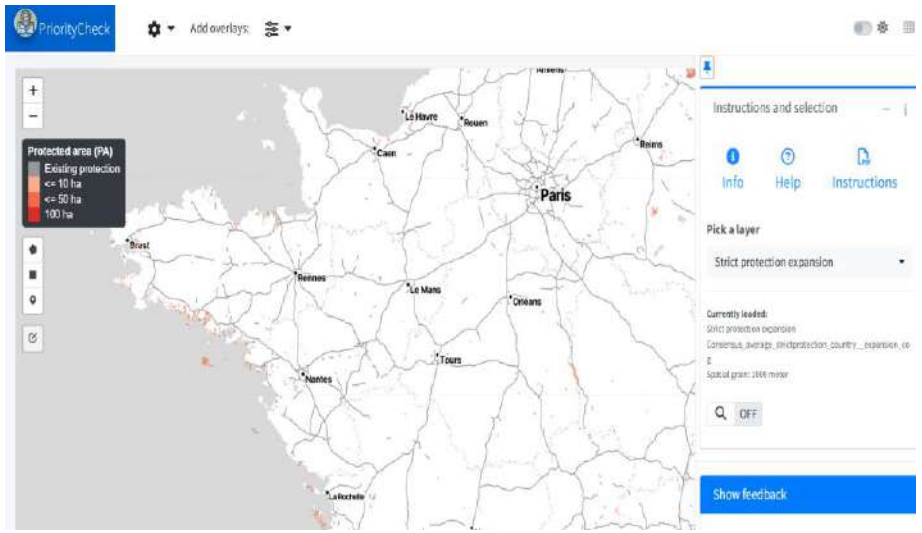
NaturaConnector

Navigate and explore all scenarios



PriorityCheck

Check and provide feedback on top priority areas



Thank you!