EUROPABON
Europa Biodiversity Observation Network

Co-designing the European Biodiversity Observation Centre and Network

Henrique M. Pereira, Jessica Junker, Daniel Kissling, Joachim Maes, Nestor Fernández, Camino Liquete, Anne Lyche Solheim, Joana Santana, Maria Lumbierres, Lluis Brottons, Aletta Bonn, Cesar Capinha, Alexandra Ordonez, Tom Breeze, Pedro Beja, Bruno Smets, Helge Bruelhede, Francisco Moreira, et al.

Andrés Mármol Guijarro (Presenter), 11th February 2025

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101007492.

A timeline of biodiversity targets

Opening of the CBD
Convention for Signature

Goal for 2020 established

1992

2002

2010

2020

United Nations Decade on Biodiversity

UNITED NATIONS DECADE ON
ECOSYSTEM
RESTORATION
2021-2030

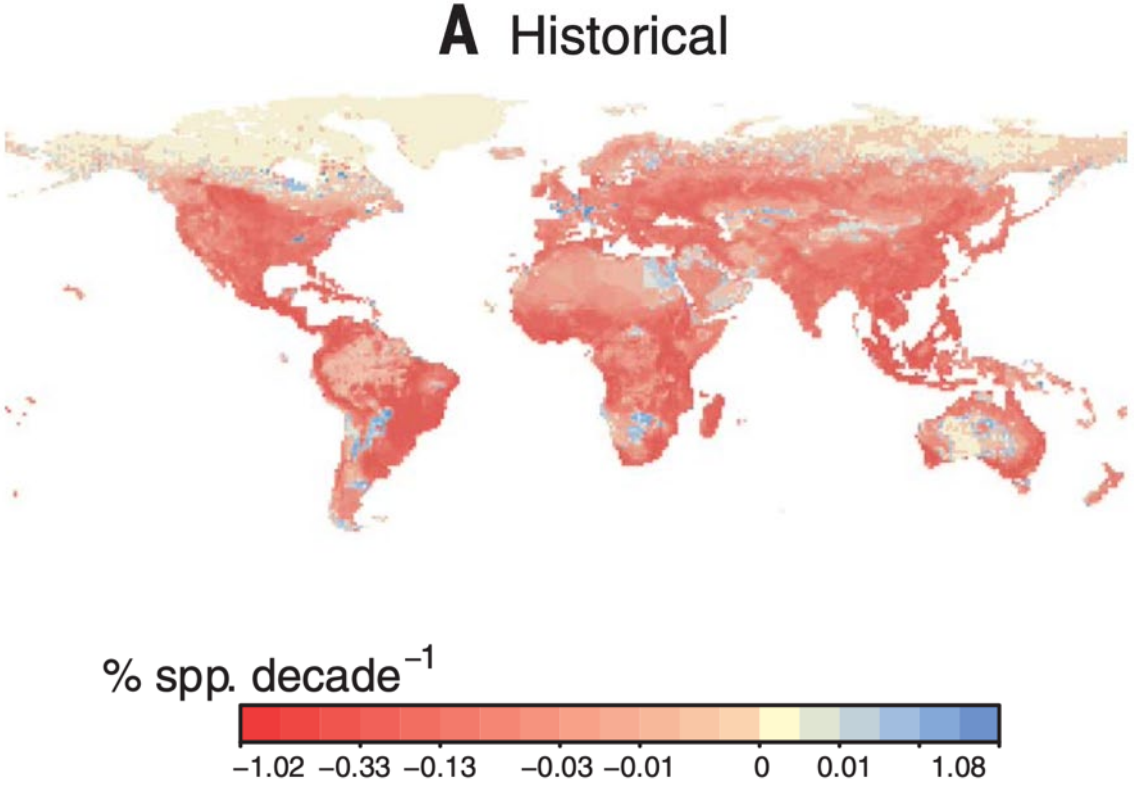
2010 Goal established

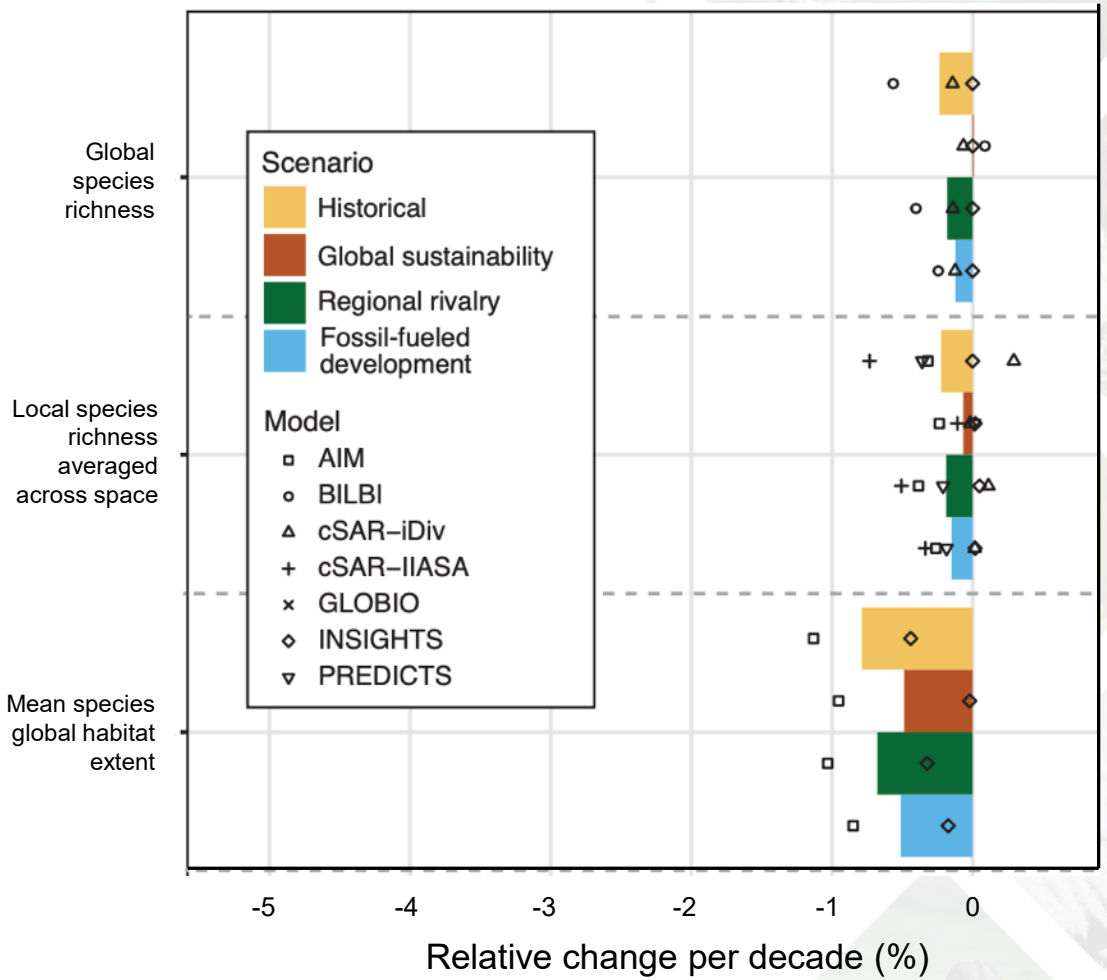
"...achieve by 2010
a significant reduction
of the current rate of
biodiversity loss"

Post-2020 Framework

EUROPABON

A global biodiversity model intercomparison





EUROPABON

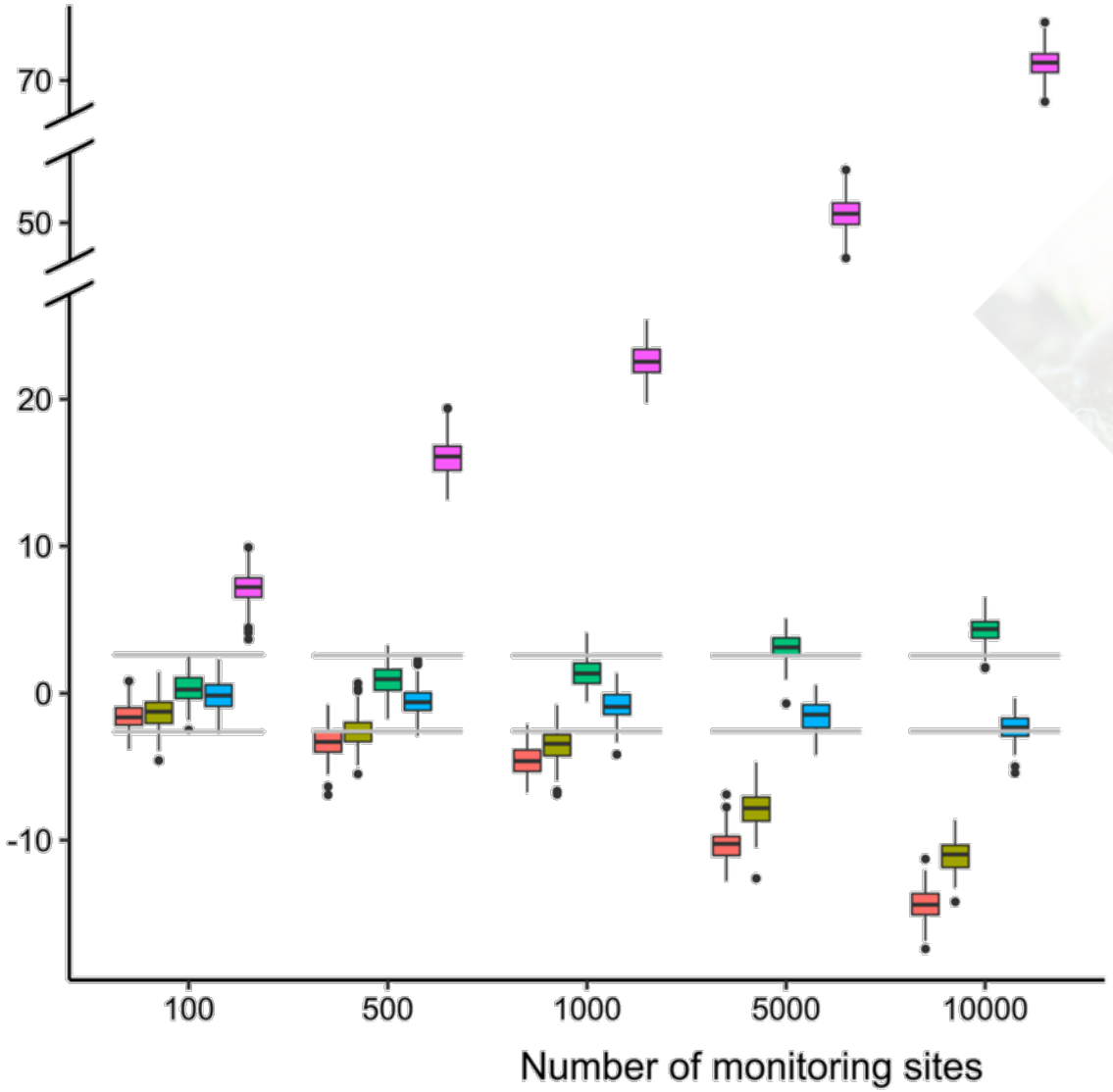
Pereira, H.M. *et al* (2024) *Science*

How good is our biodiversity monitoring data?

False trends detected

Trends not-detected

Correct trends detected



EUROPABON

Valdez, *et al* (2023) *Ecography*

The SC5-33-2020 Call:
Monitoring ecosystems through research, innovation and technology

Many EU policies rely on the supply of regularly updated biodiversity data

To harness scientific advances and **bring together various actors** to strengthen current efforts and devise a **cost-effective** approach to monitoring **combining in-situ, space and air-born monitoring**

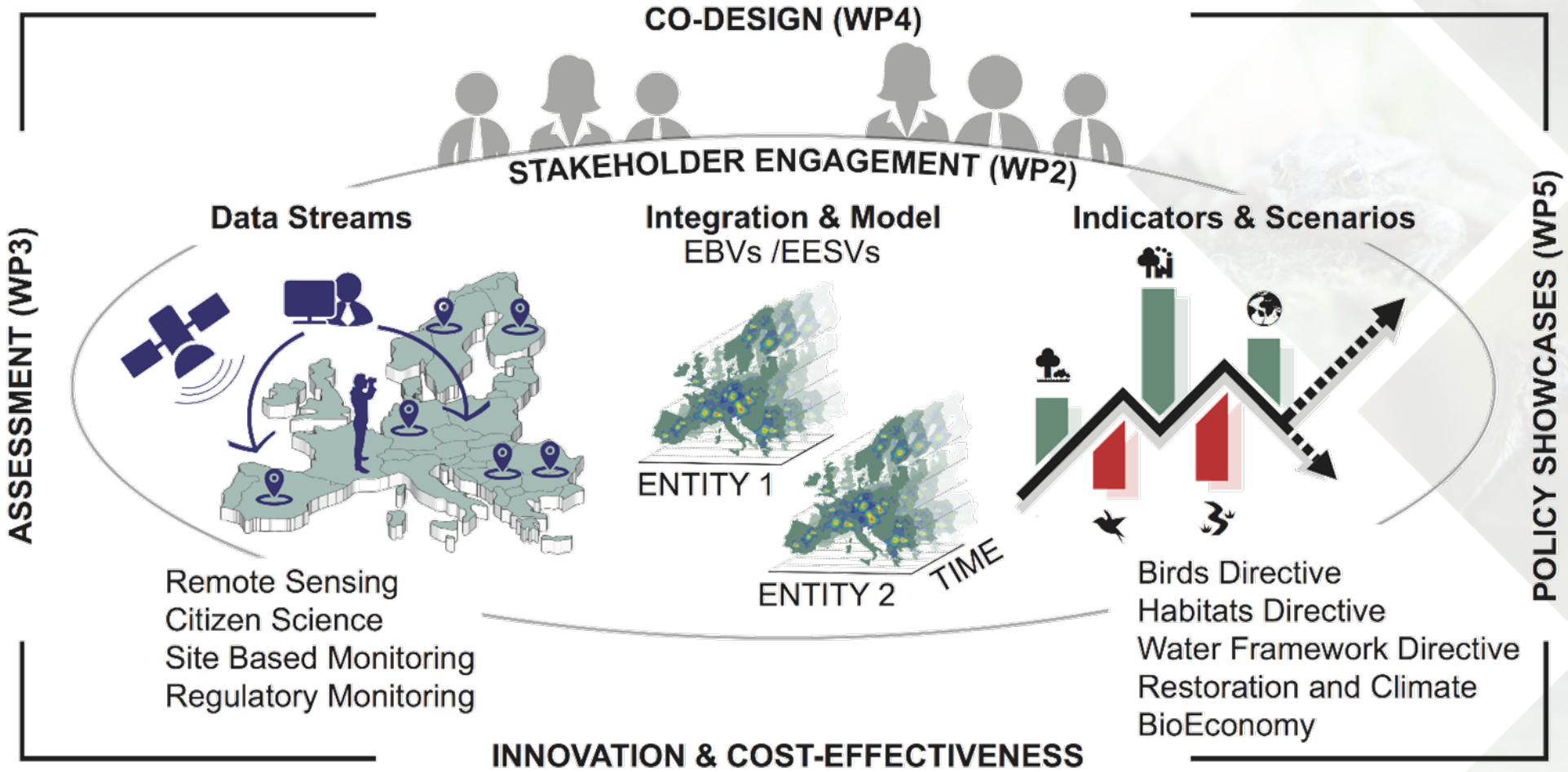
The action should design an **EU-wide framework for monitoring biodiversity and ecosystem services**

Horizon 2020 Programme

EUROPABON

EuropaBON project

Designing an EU-wide framework for monitoring biodiversity

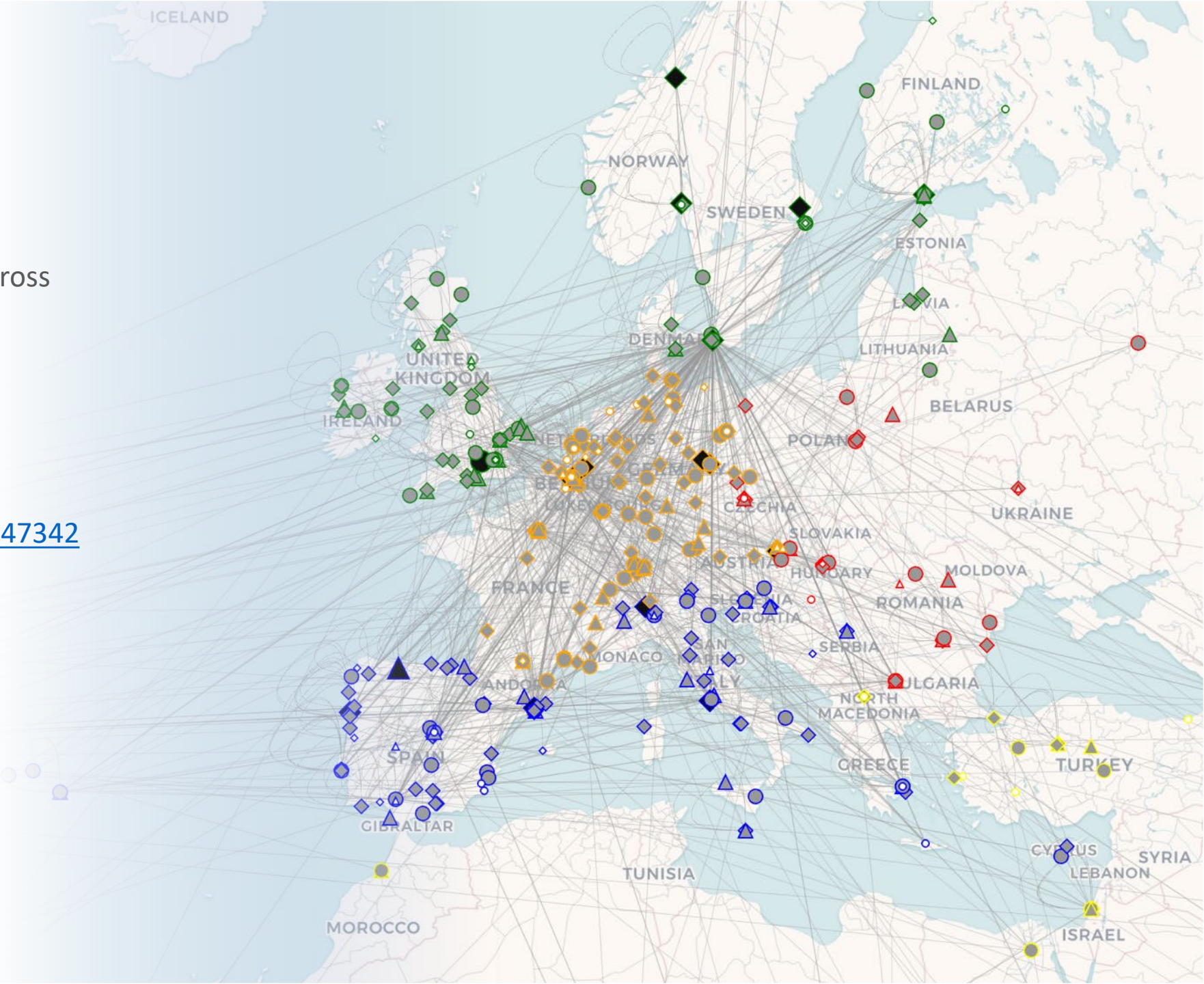


EUROPABON

The consortium and the EuropaBON network of members

- A consortium with 17 partners across Europe
- About 1600 members in over 70 countries

https://doi.org/10.5281/zenodo.10047342

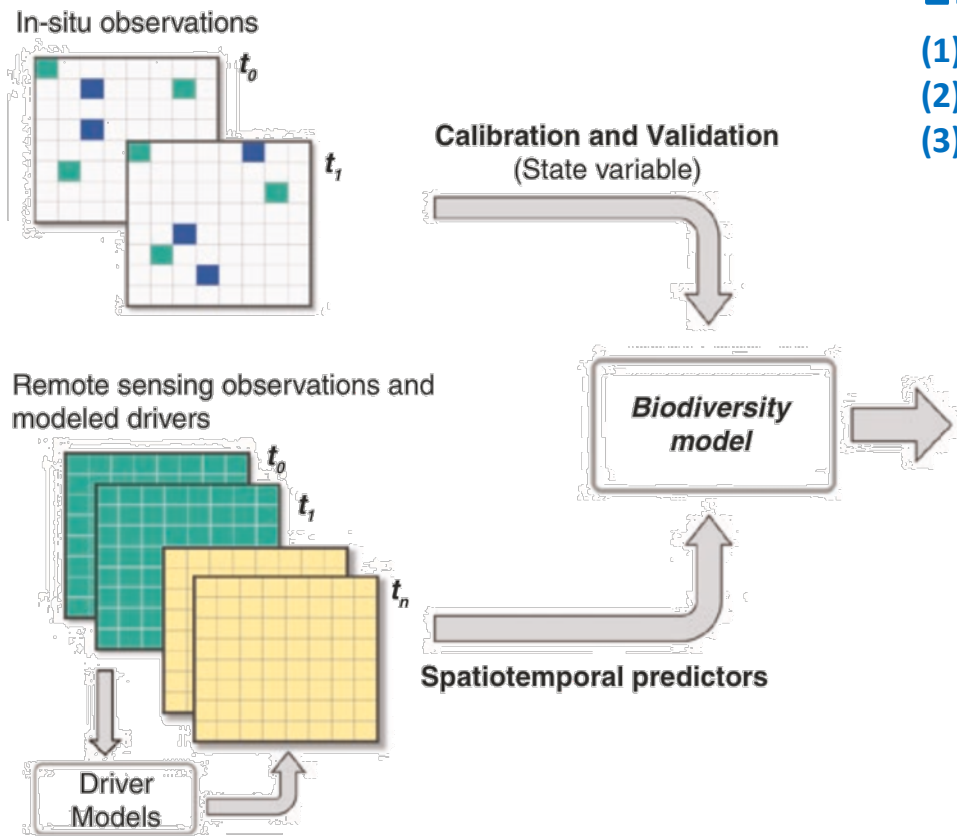


EUROPABON

Designing a Biodiversity Observation Network with Essential Biodiversity Variables

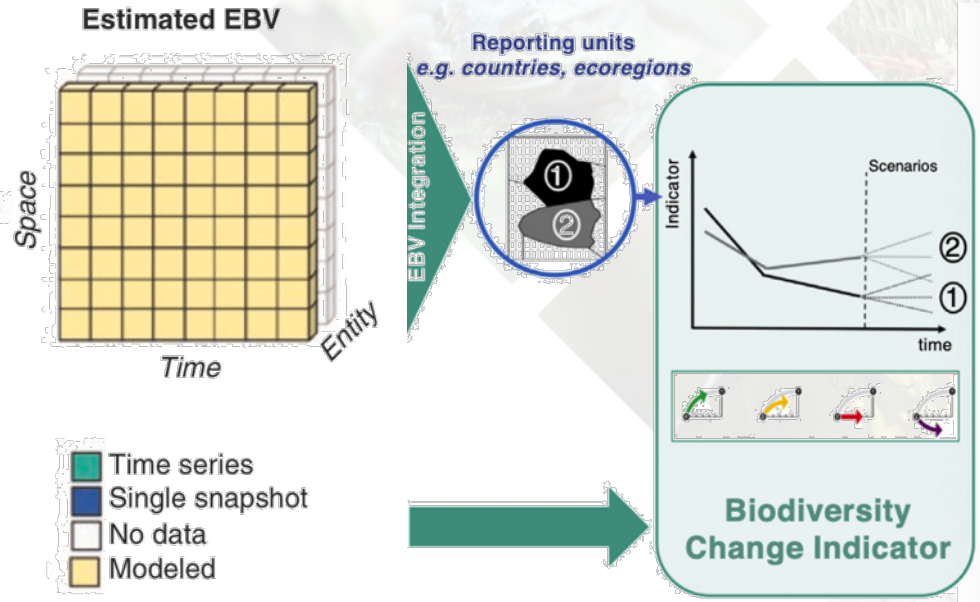
Monitoring design

(1) Where and how to monitor?
(2) How to integrate data?
(3) What models to use?



EBV Selection

(1) Which EBV are needed for each policy question?
(2) What taxa and ecosystems?
(3) What spatial and temporal resolution?

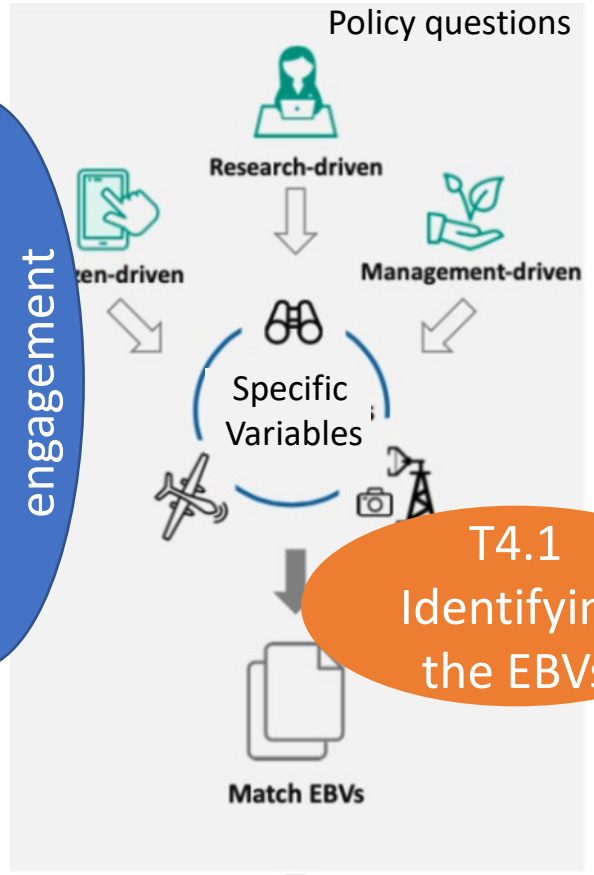


EUROPABON

Fernández et al (2020) in Remote Sensing of Plant Biodiversity

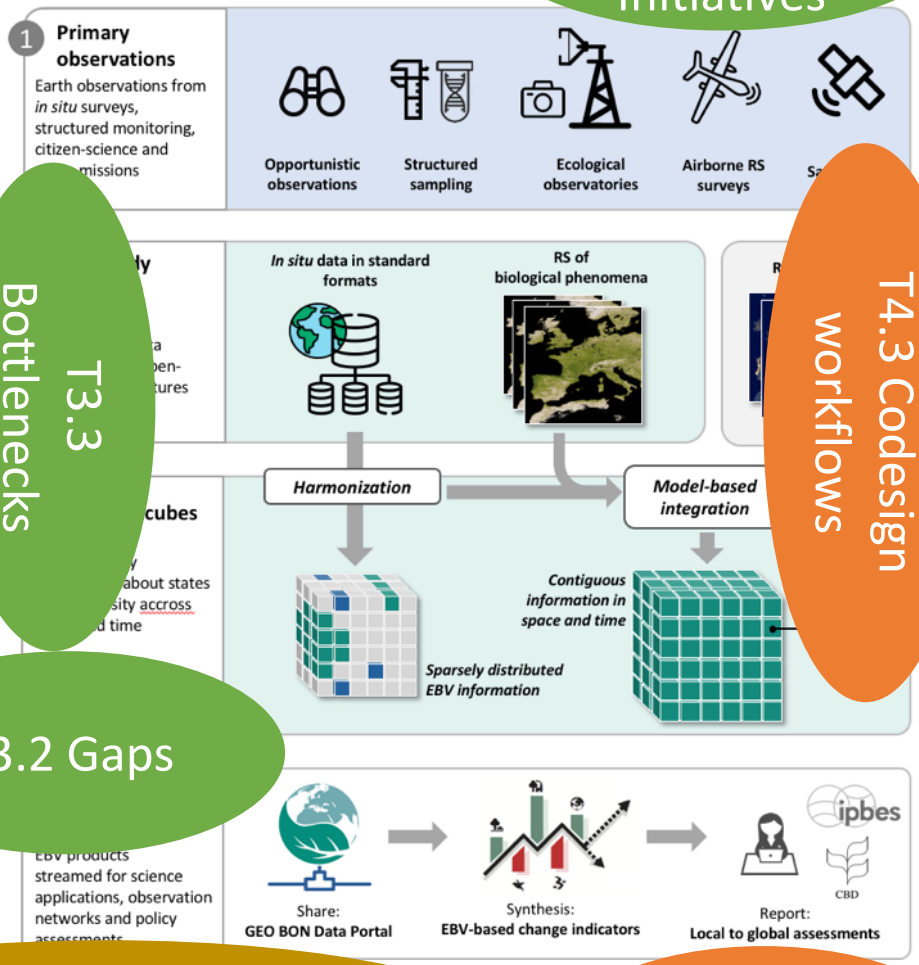
Organization of EuropaBON tasks

EBV Selection



Refined EBV list

Monitoring design



WP2 Stakeholder engagement

T4.1 Identifying the EBVs

T3.1 Monitoring Initiatives

T3.4 Cost-effectiveness

T4.2 New technologies

T3.3 Bottlenecks

T3.2 Gaps

T4.3 Codesign workflows

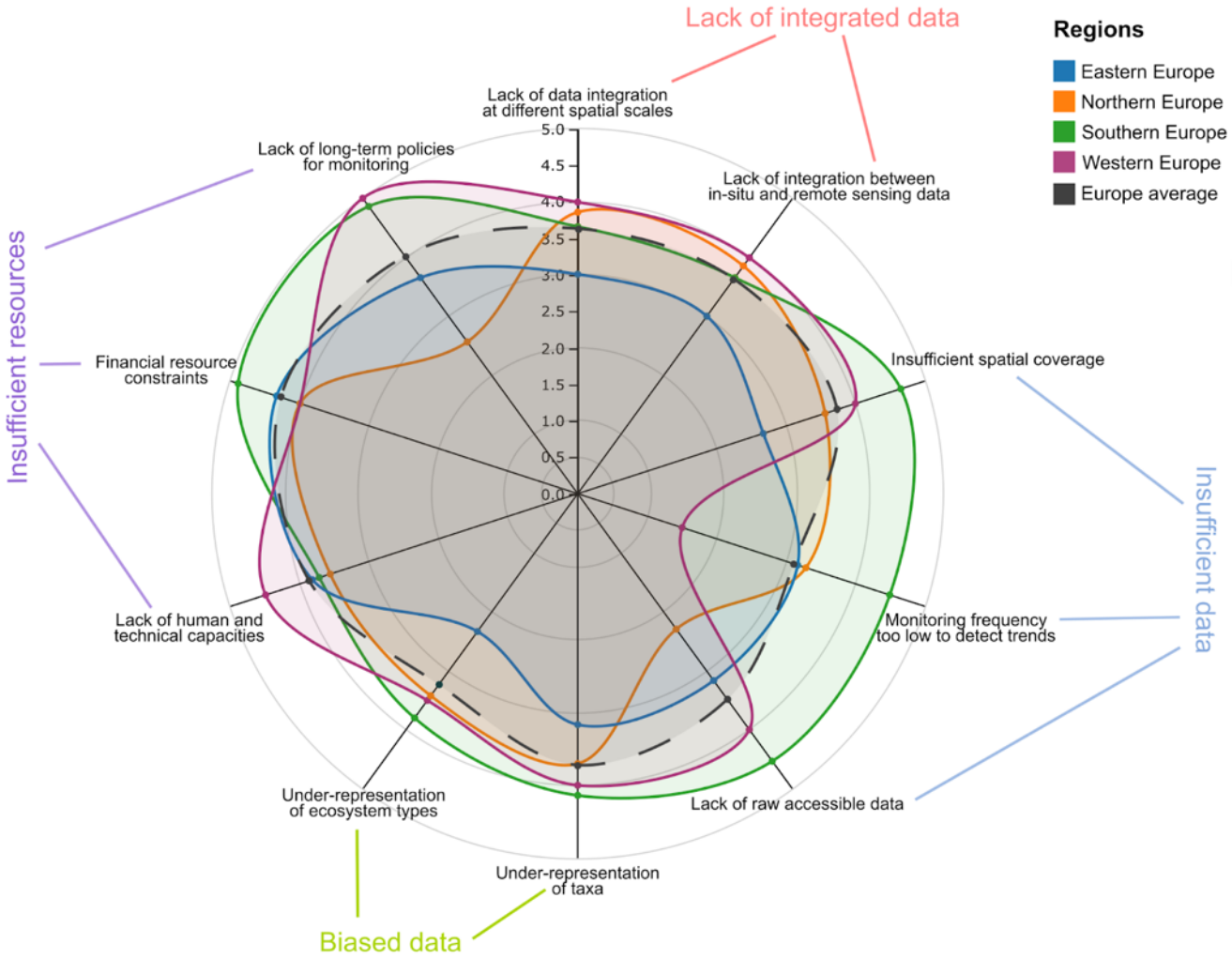
T2.4 Terms of reference EBOCC

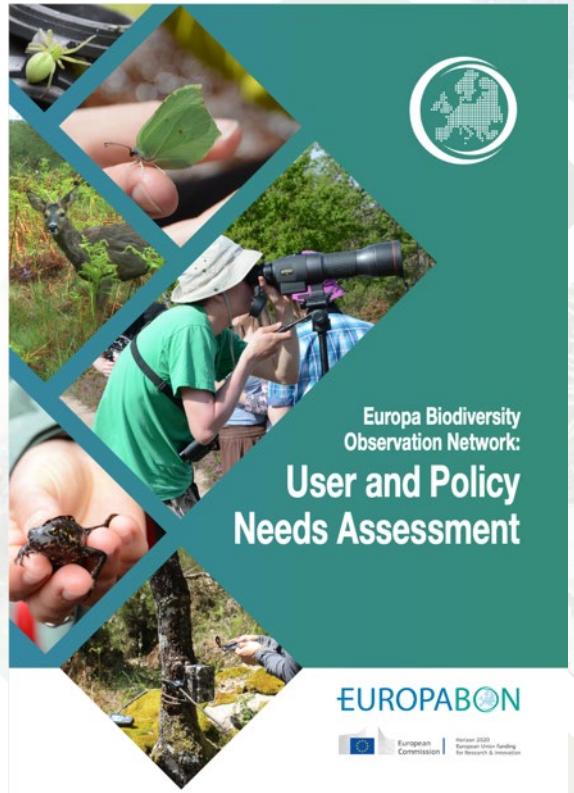
WP5 Showcases

T4.4 Benefits

EUROPABON

User needs challenges

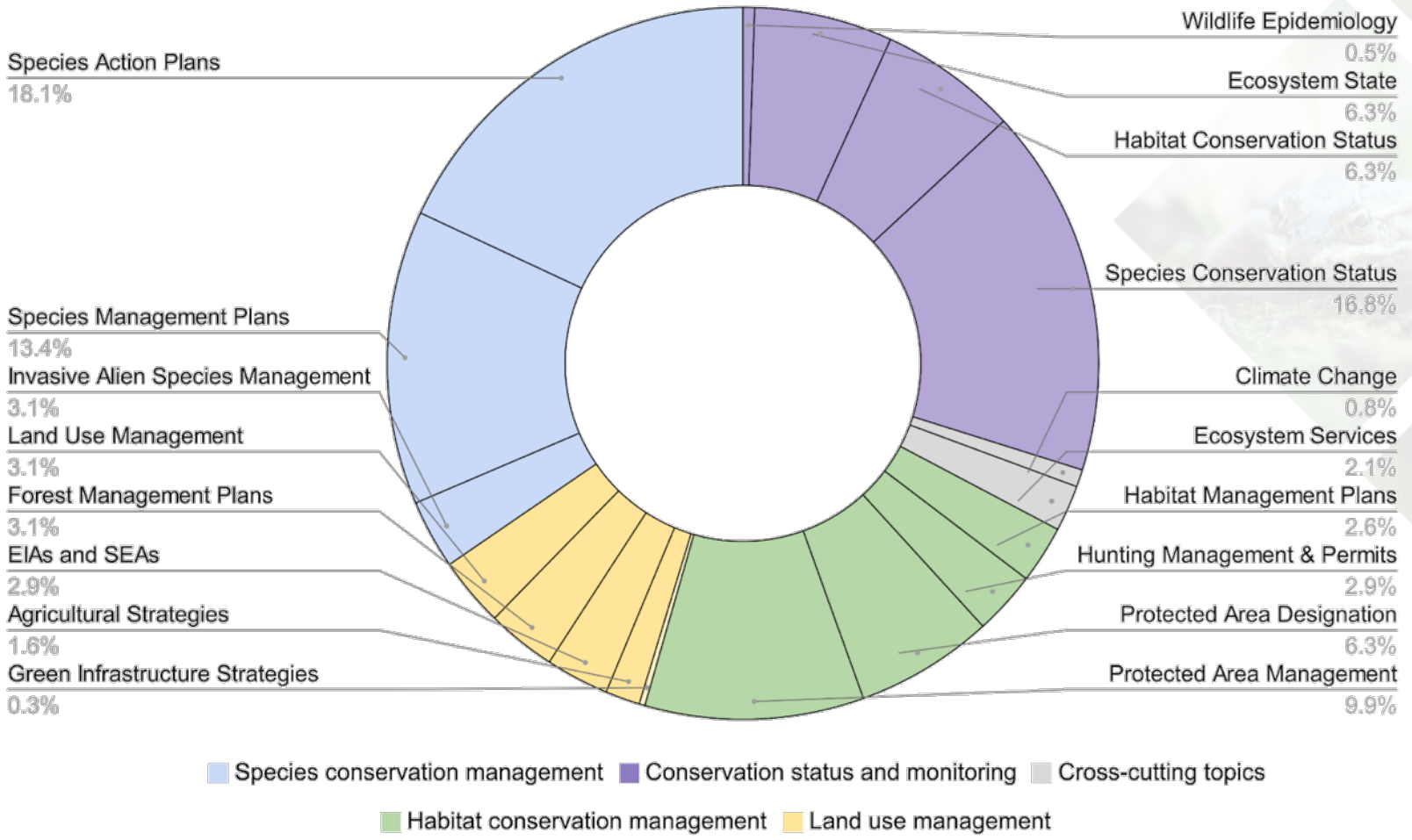




EUROPABON

Moersberger et al (2024) in Conservation Lettters

Selecting EBVs only makes sense in the light of user needs



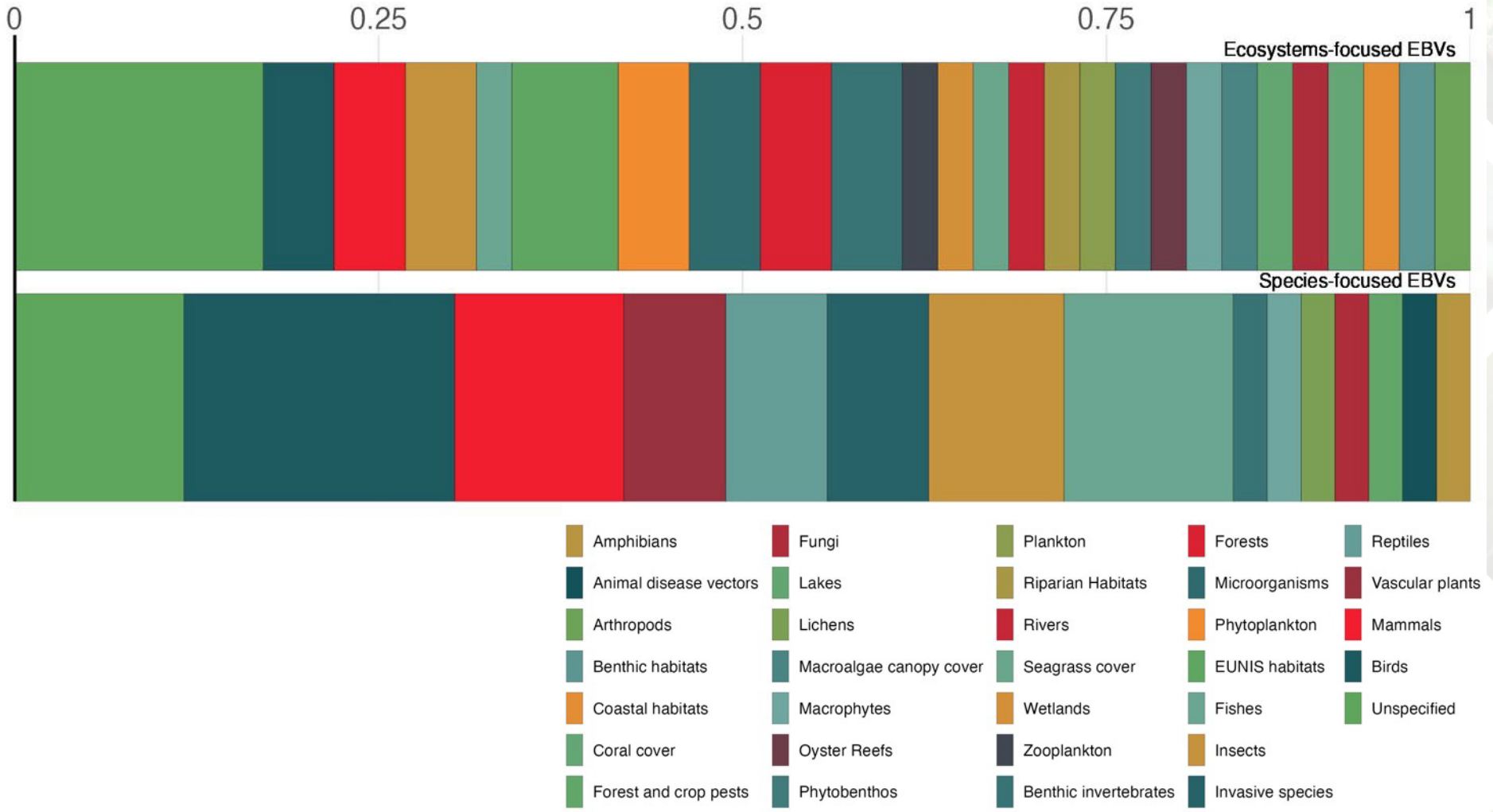
EUROPABON

Moersberger et al (2024) in Conservation Lettters



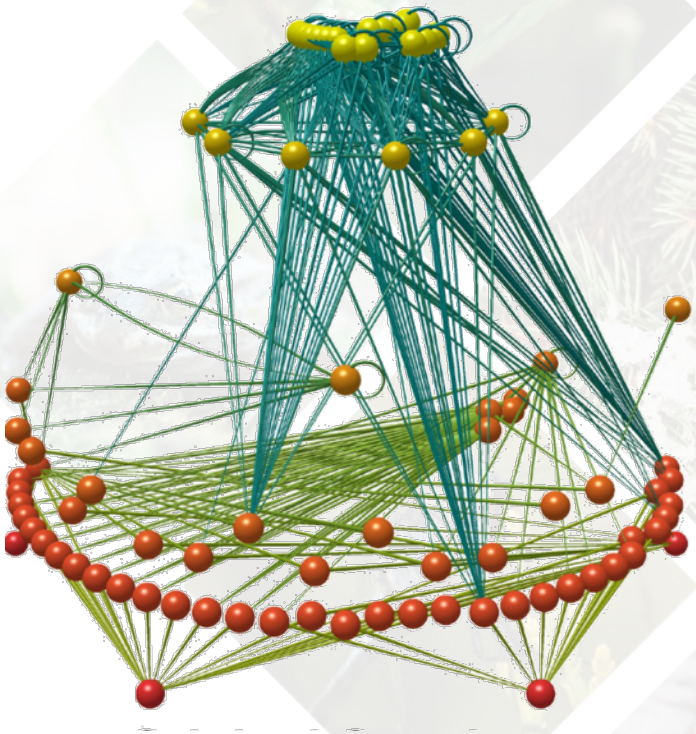
EuropaBON EBVs Taxonomic Coverage

Proportion of EBVs

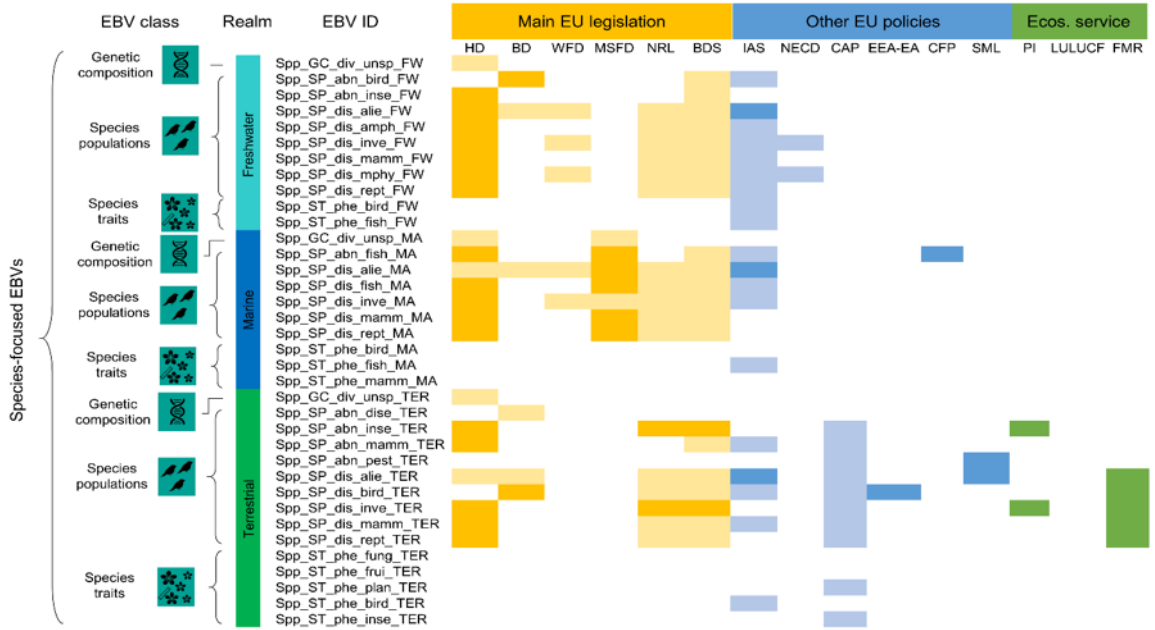


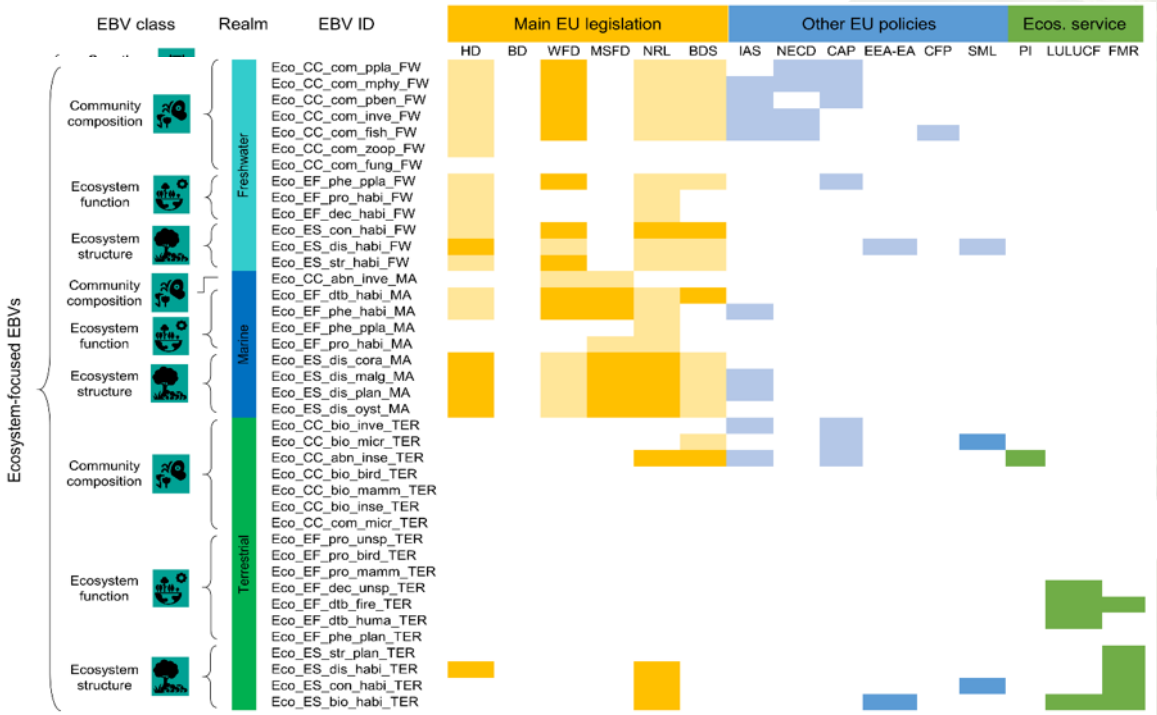
EUROPABON

Junker et al (2023) List of EBVs



A list of balanced EBVs





84 EBVs

c.a. 75 % directly or indirectly reporting to Main Env. Policy

Several more EBVs related to Ecosystem Service Policy

EUROPABON

Kissling et al (in review)

A database of monitoring integration in Europe

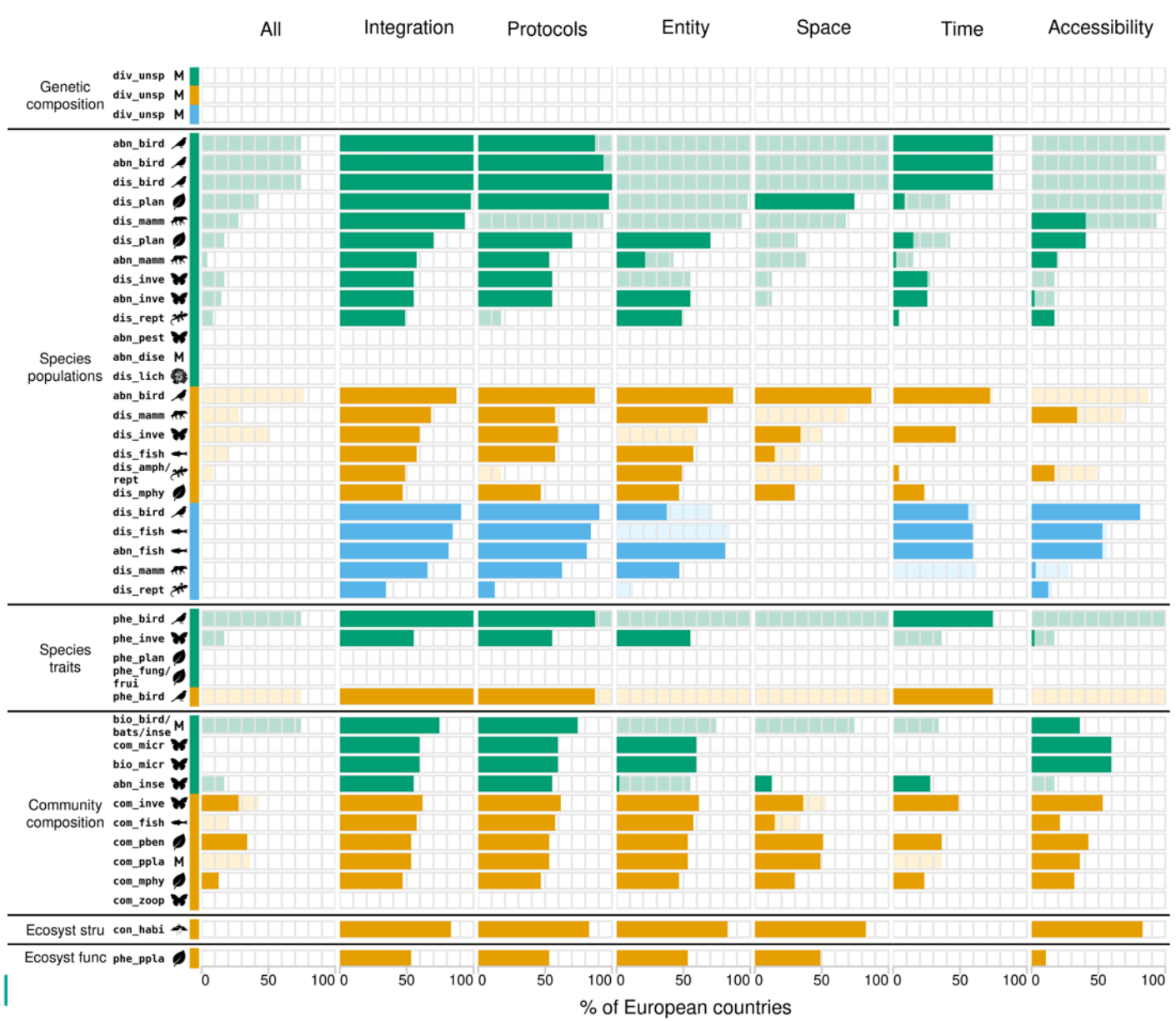
Freshwater monitoring

Butterfly monitoring

EUROPABON

https://monitoring.europabon.org/monitoring/

Assessing existing biodiversity monitoring



No PartialGap

- Terrestrial
- Freshwater
- Marine

Taxonomic/ ecosystem scope

- Habitats
- Plants
- Lichens
- Invertebrates
- Fish
- Amphibians and reptiles
- Birds
- Mammals
- M Multiple taxa

Report on gaps and important new areas for monitoring in Europe: https://preprints.arphahub.com/article/103657/

Designing monitoring around EBV workflows

1 Data collection & sampling

Existing monitoring methods

- Structured surveys (e.g. transects counts) or opportunistic observations
- Trait or DNA sampling (e.g. phenology records)
- Airborne or satellite remote sensing (e.g. radar, hyperspectral, LiDAR)

National or EU-wide monitoring initiatives

- PanEuropean Common Bird Monitoring Scheme (PECBMS)
- Water Information System for Europe (WISE)
- Copernicus Land Monitoring Service

Emerging tools

- Digital sensors (e.g. cameras, sound devices)
- Citizen science apps
- eDNA sampling (e.g. soil , water)

2 Data integration

Standardizing field data

- Standardized sampling & data entry protocols
- Data aggregation & harmonization
- National or EU-wide integration nodes

Data exchange and automation

- Data transfer mechanisms (e.g. APIs) and exchange formats
- Automated, end-to-end data streams

Computational integration

- Centralized data repositories
- Data access and machine readability
- Integration of ground truth and remote sensing data (training points)

3 Modelling

Statistical modelling & extrapolation

Regression & machine learning (e.g. species distribution models)

Models for trend analysis & forecasting

Biodiversity change indicators

Short-term ecological forecasts

Artificial intelligence

AI for species detection, tracking, classification & segmentation

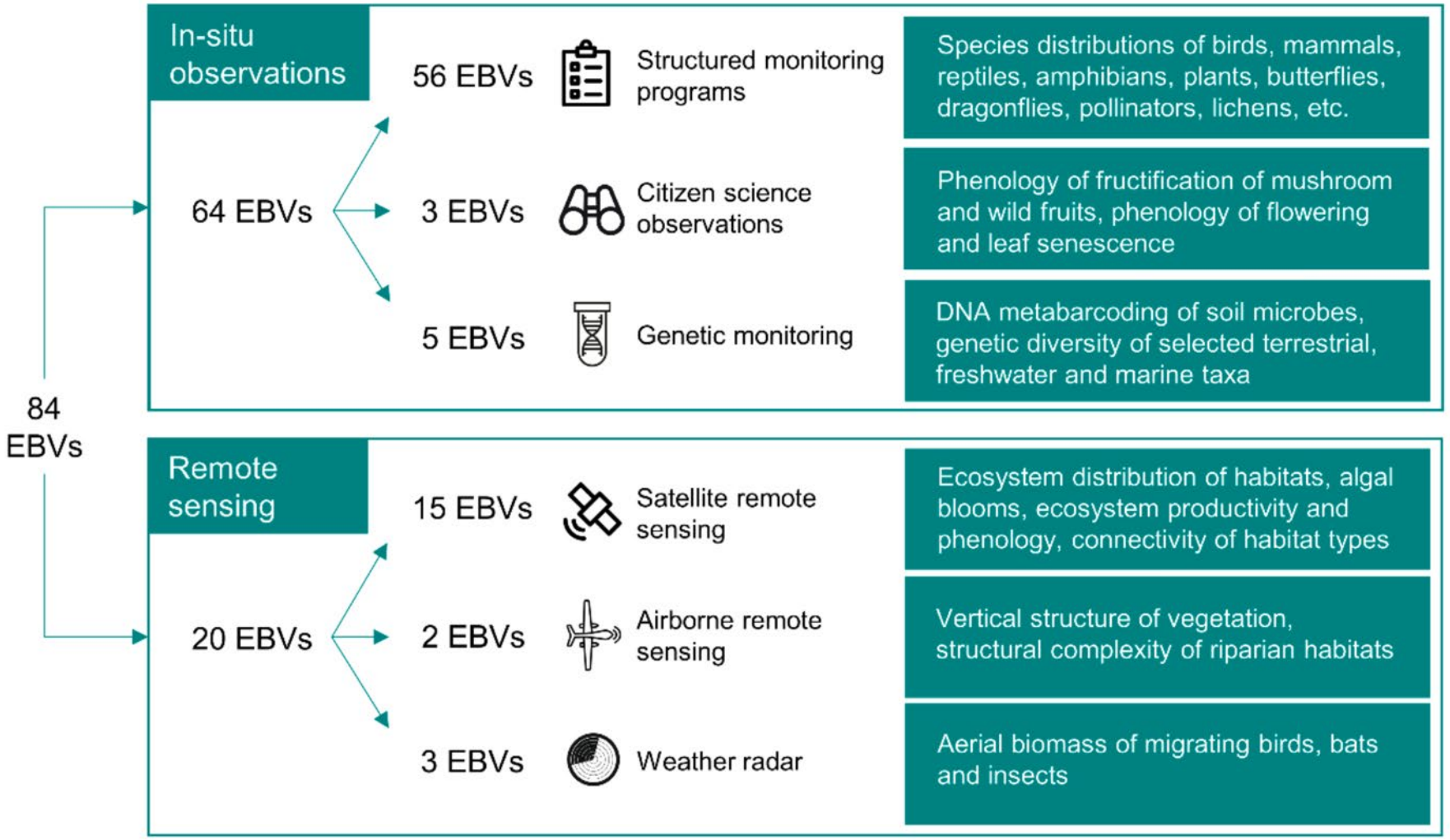
Spatiotemporal ensemble modelling

Multi-model comparison, parameter optimization, meta-learners

EUROPABON

Kissling et al (in review)

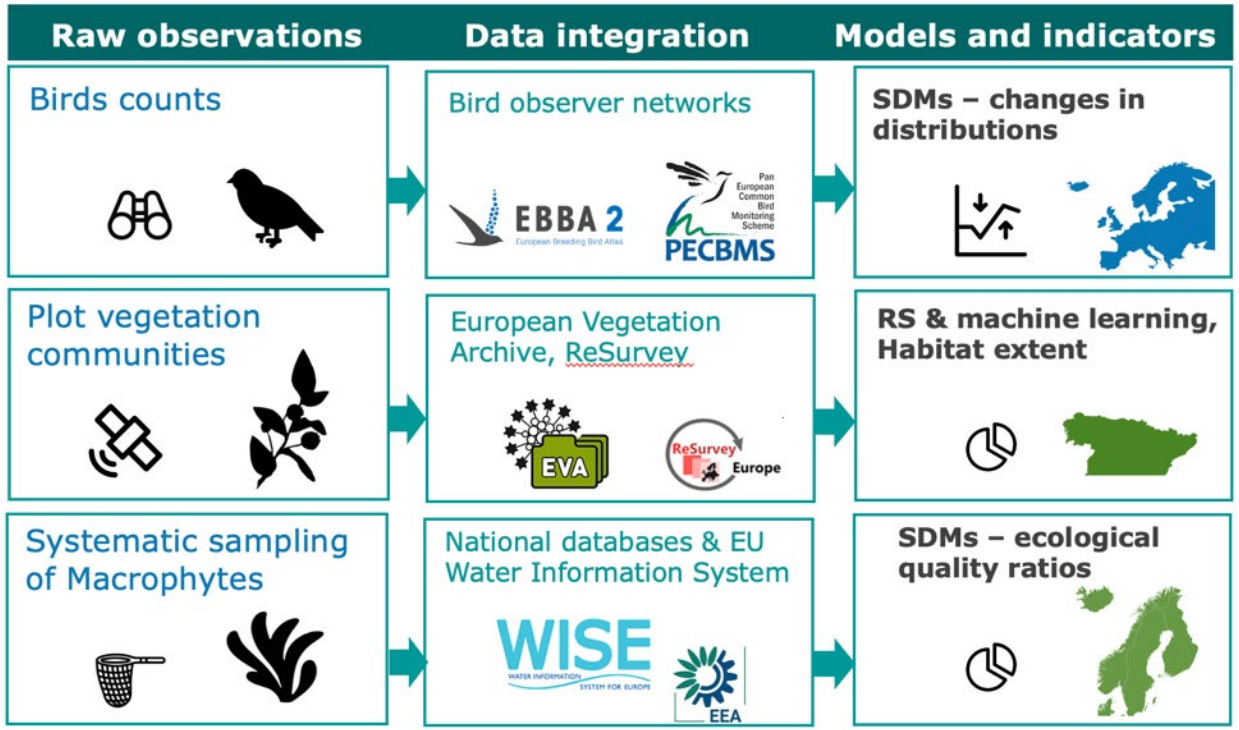
How to collect the data

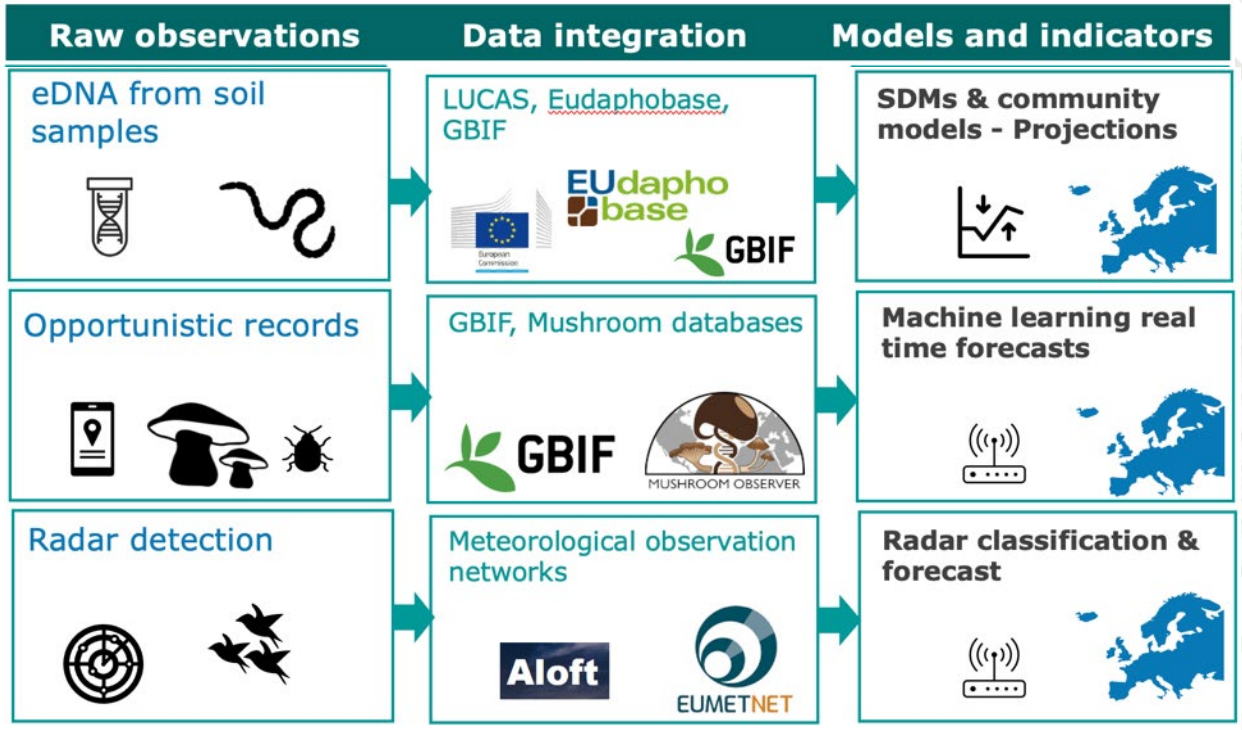


EUROPABON

Kissling et al (in review)

EBV workflow demonstration in showcases





Report on Birds Directive showcase available at
https://doi.org/10.3897/arphapreprints.e126021

Report on Habitats Directive showcase available at
https://doi.org/10.3897/arphapreprints.e128158

Report on Water Framework Directive showcase
https://doi.org/10.3897/arphapreprints.e128109

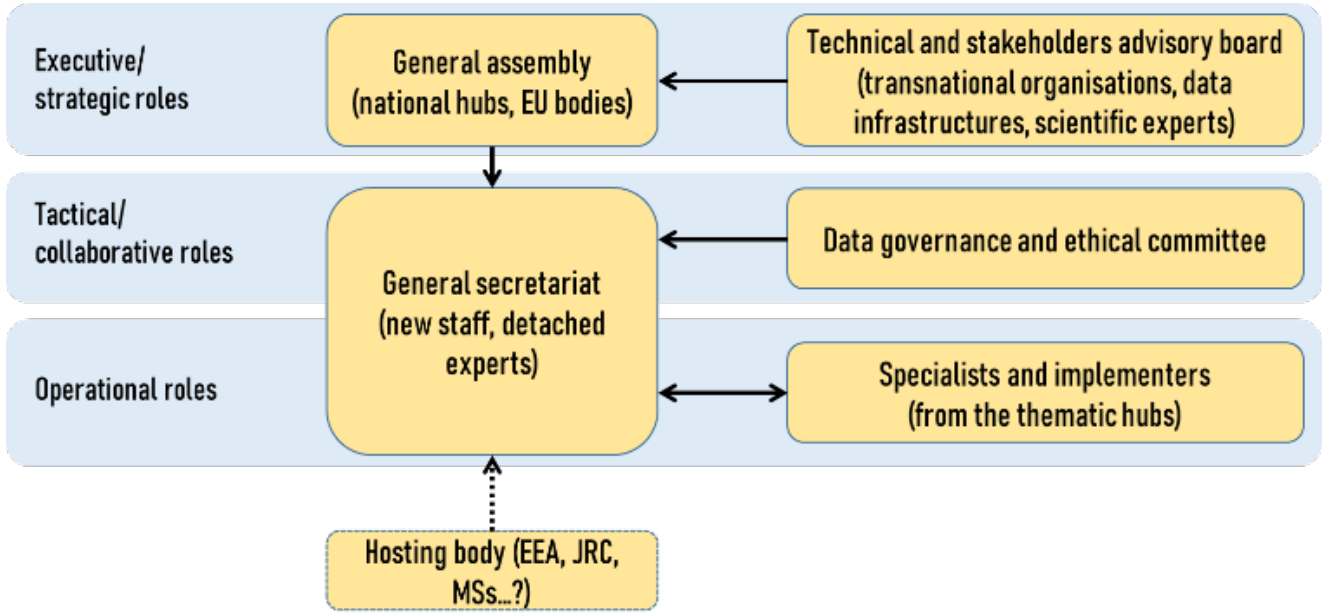
Report on Soil EBVs for ecosystem restoration
https://doi.org/10.3897/arphapreprints.e128926

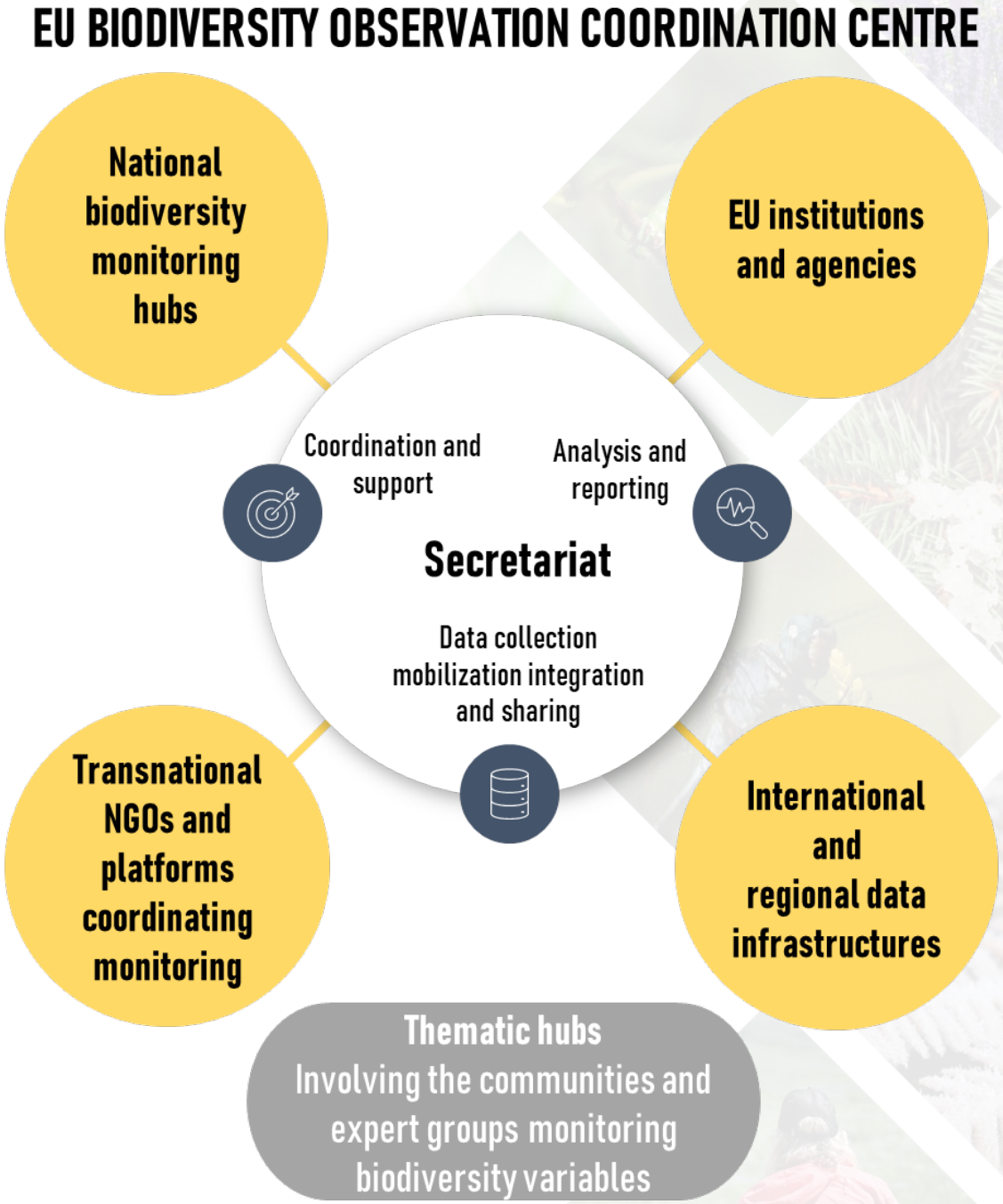
Report on Bioeconomy showcase available at
https://doi.org/10.3897/arphapreprints.e119131

EUROPABON

EBV workflow templates

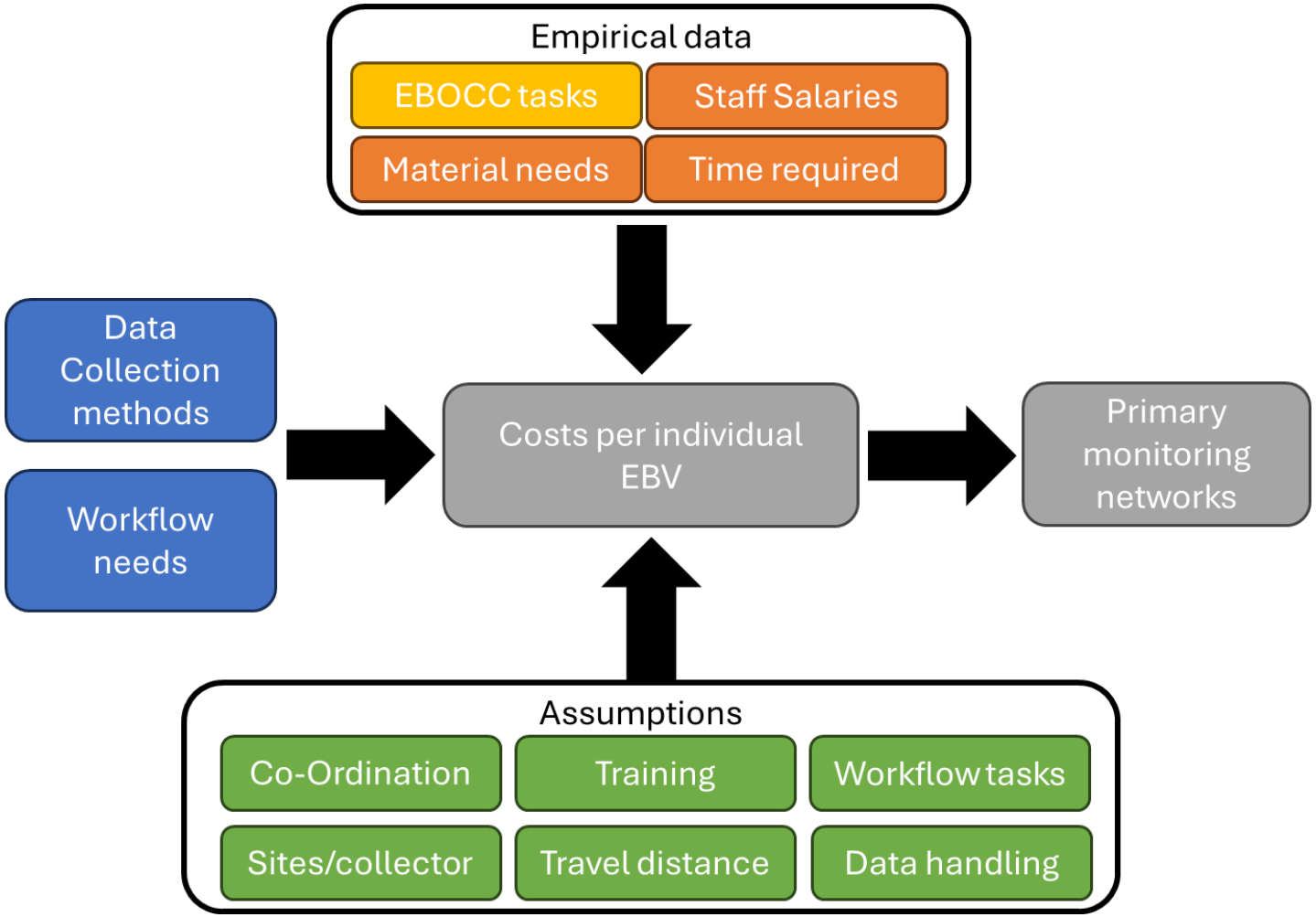
The EBOCC (regional nod for GBiOS)





EUROPABON

Costing the implementation of the EBOCC

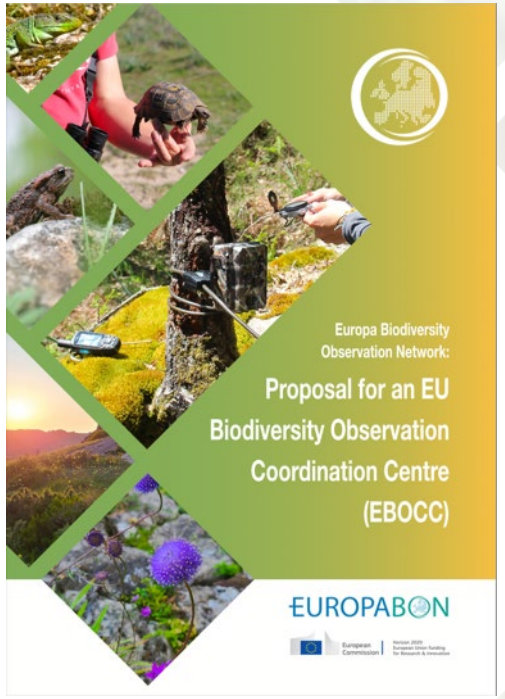


~50 M€ per year for integration and coordination

~500 M€ for monitoring implementation

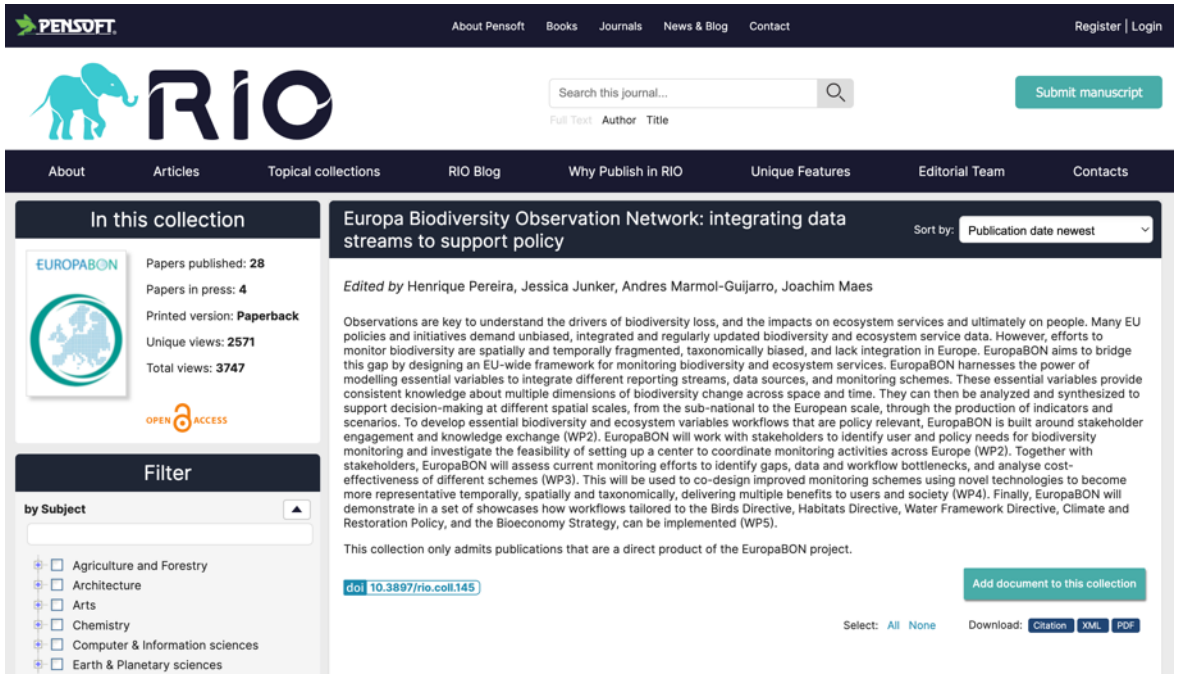
Benefits one order of magnitude greater

Innovation, natural capital, environmental impact assessment, cost-saving

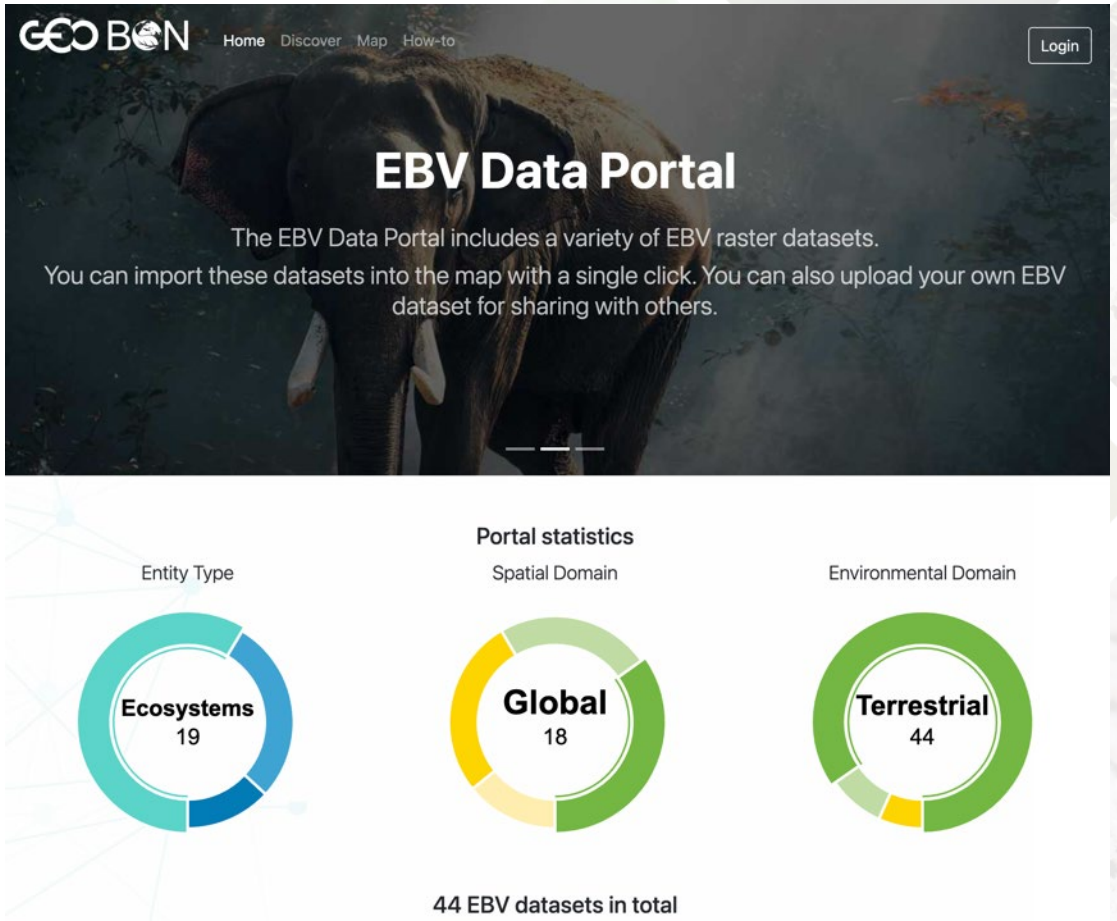


EUROPABON

Findable, accessible, interoperable and reusable!



https://doi.org/10.3897/rio.coll.145

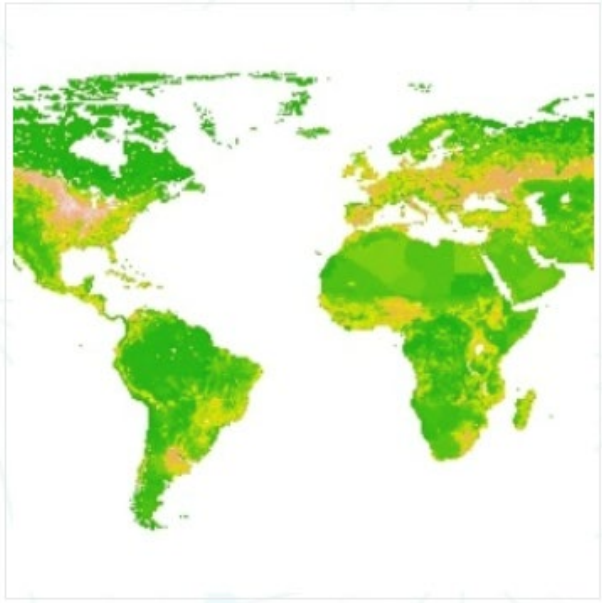


https://portal.geobon.org/home

EUROPABON

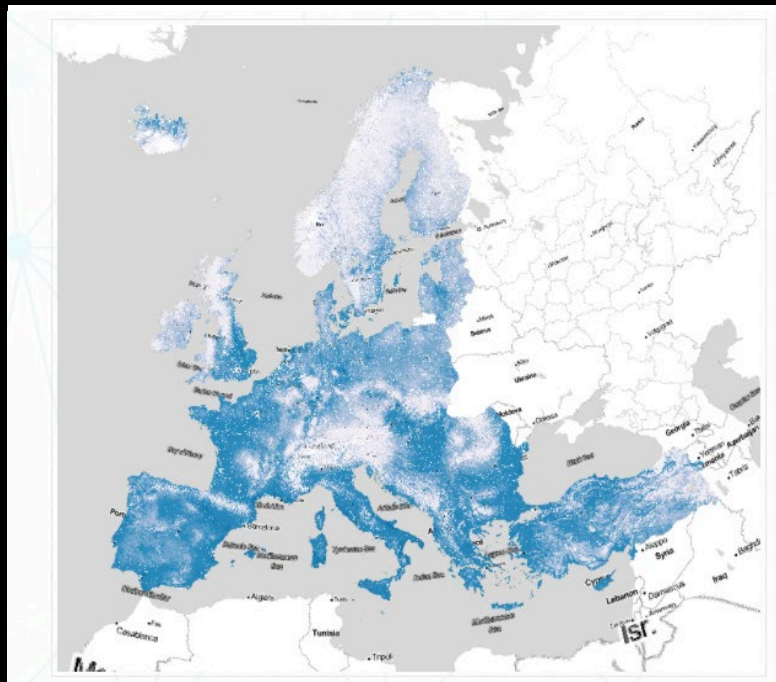
EBV data portal scope:

Global, regional and National Essential Biodiversity Variables data



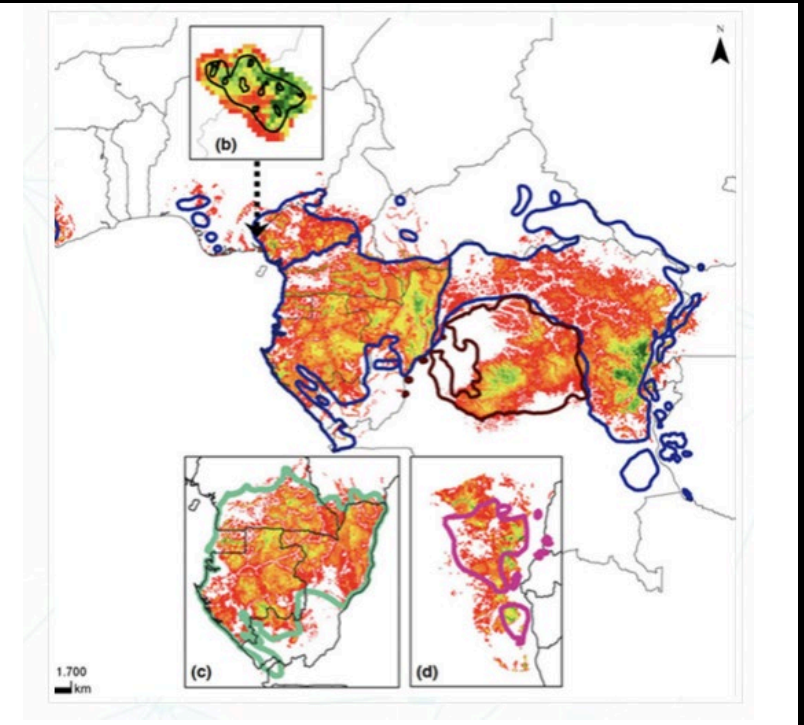
Historical local species richness (PREDICTS)

By Samantha Hill



Predicted suitability for EUNIS habitat types for EU27 countries

By Stephan Hennekens



Habitat availability for African great apes

By Jessica Junker

Community composition

Ecosystem structure

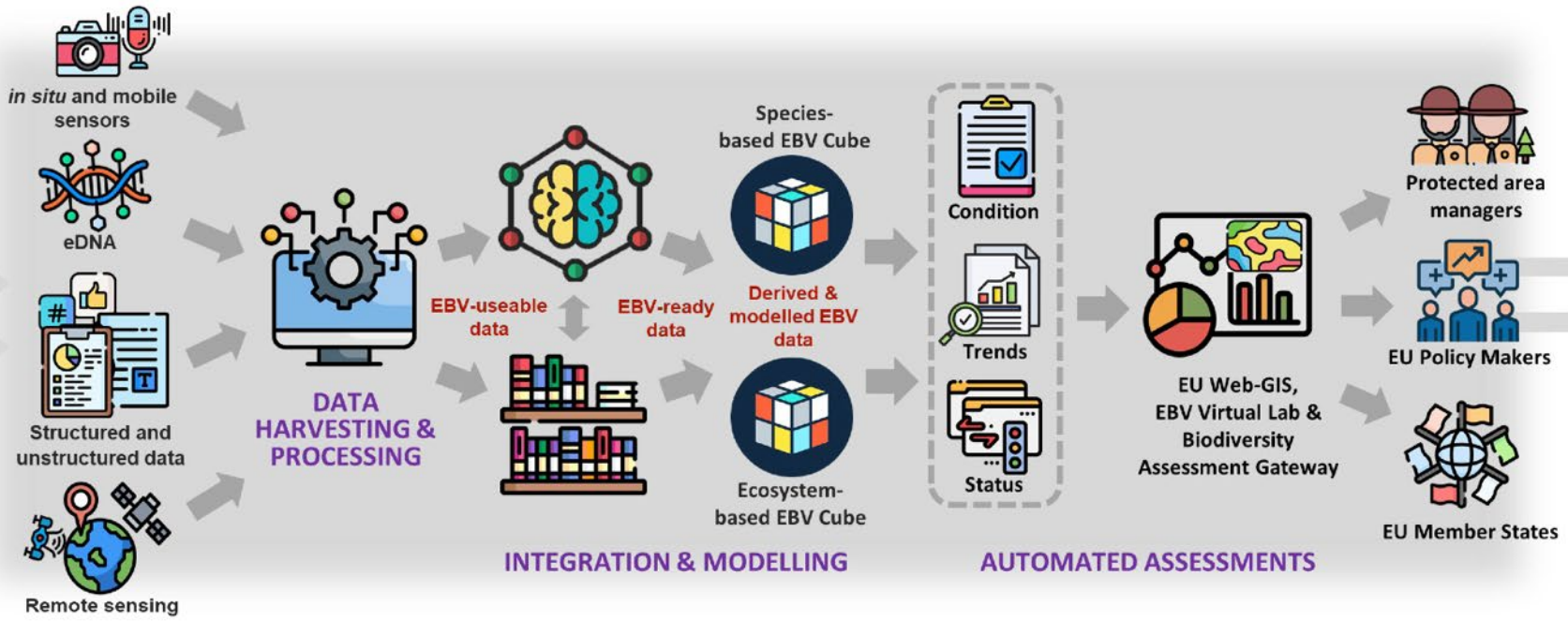
Species populations

Assessment of users and policy needs, data gaps, models and tools

Coordinating existing biodiversity monitoring schemes

Support: Funding opportunities, collaboration, reporting

STAKEHOLDER ENGAGEMENT & CO-DESIGN



DIGITAL INFRASTRUCTURE

GBIF

OBIS OCEAN BIODIVERSITY INFORMATION SYSTEM

Copernicus Europe's eyes on Earth

EBV Data Portal

BON IN A BOX

EUROPABON

THANK YOU

iDiv

MARTIN-LUTHER
UNIVERSITÄT
HALLE-WITTENBERG

europabon.org