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# Towards structured biodiversity data

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# GEO BON: a network of networks

- Vision

  A **global biodiversity observation network** that contributes to effective **management policies** for the world's biodiversity and ecosystem services.

- Volunteer-based
- Long-term
- **Openness**
- Small secretariat
- Biodiversity monitoring

**GEO Flagship**

# GEO BON core focus

**Developing a standard and flexible framework for biodiversity observations**

**Supporting the development of Biodiversity Observation Networks**

**Producing Policy Relevant Outputs**

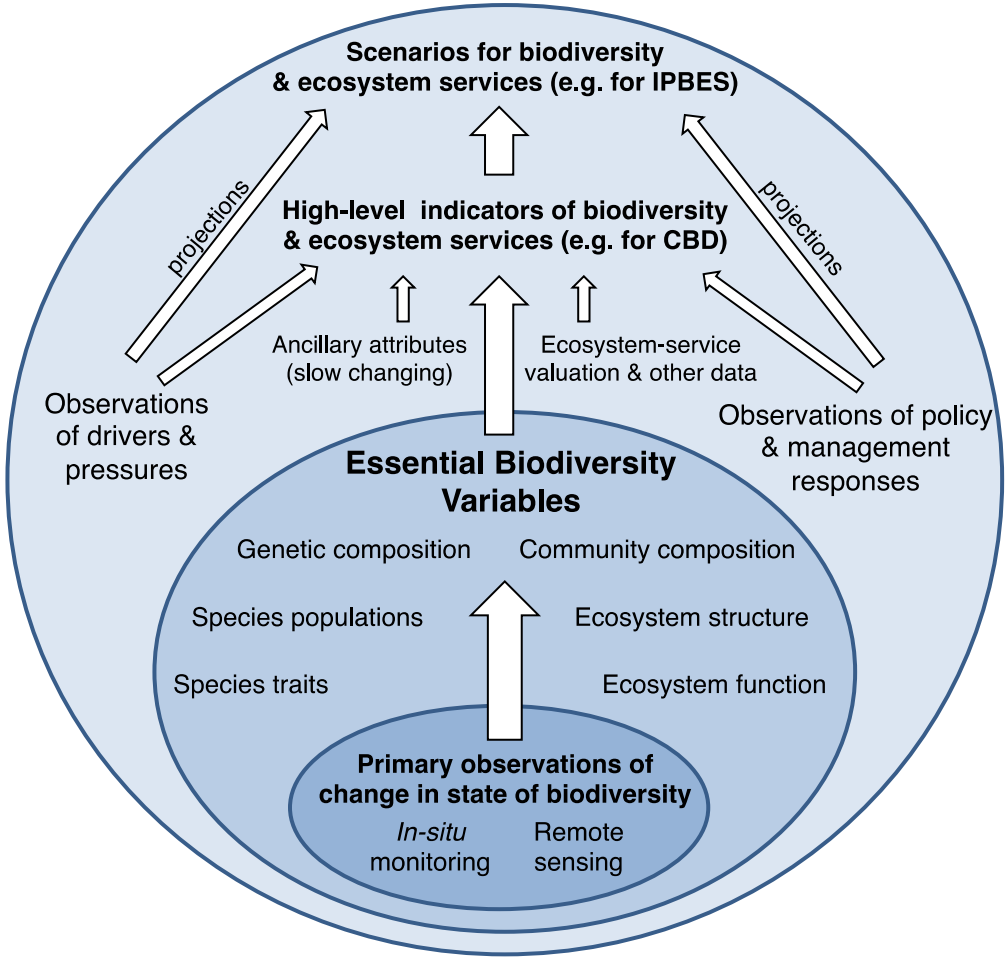
# Essential Biodiversity Variables

## Examples of candidate Essential Biodiversity Variables

| EBV class | EBV examples | Measurement and scalability | Temporal sensitivity | Feasibility | Relevance for CBD targets and indicators (*1,9*) |
|---|---|---|---|---|---|
| Genetic composition | Allelic diversity | Genotypes of selected species (e.g., endangered, domesticated) at representative locations. | Generation time | Data available for many species and for several locations, but little global systematic sampling. | Targets: 12, 13. Indicators: Trends in genetic diversity of selected species and of domesticated animals and cultivated plants; RLI. |
| Species populations | Abundances and distributions | Counts or presence surveys for groups of species easy to monitor or important for ES, over an extensive network of sites, complemented with incidental data. | 1 to >10 years | Standardized counts under way for some taxa but geographically restricted. Presence data collected for more taxa. Ongoing data integration efforts (Global Biodiversity Information Facility, Map of Life). | Targets: 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15. Indicators: LPI; WBI; RLI; population and extinction risk trends of target species, forest specialists in forests under restoration, and species that provide ES; trends in invasive alien species; trends in climatic impacts on populations. |
| Species traits | Phenology | Timing of leaf coloration by RS, with in situ validation. | 1 year | Several ongoing initiatives (Phenological Eyes Network, PhenoCam, etc.) | Targets: 10, 15. Indicators: Trends in extent and rate of shifts of boundaries of vulnerable ecosystems. |
| Community composition | Taxonomic diversity | Consistent multitaxa surveys and metagenomics at select locations. | 5 to >10 years | Ongoing at intensive monitoring sites (opportunities for expansion). Metagenomics and hyperspectral RS emerging. | Targets: 8, 10, 14. Indicators: Trends in condition and vulnerability of ecosystems; trends in climatic impacts on community composition. |
| Ecosystem structure | Habitat structure | RS of cover (or biomass) by height (or depth) globally or regionally. | 1 to 5 years | Global terrestrial maps available with RS (e.g., Light Detection and Ranging). Marine and freshwater habitats mapped by combining RS and in situ data. | Targets: 5, 11, 14, 15. Indicators: Extent of forest and forest types; mangrove extent; seagrass extent; extent of habitats that provide carbon storage. |
| Ecosystem function | Nutrient retention | Nutrient output/input ratios measured at select locations. Combine with RS to model regionally. | 1 year | Intensive monitoring sites exist for N saturation in acid-deposition areas and P retention in affected rivers. | Targets: 5, 8, 14. Indicators: Trends in delivery of multiple ES; trends in condition and vulnerability of ecosystems. |

Pereira, H.M., Ferrier S. et al (2013) *Science*

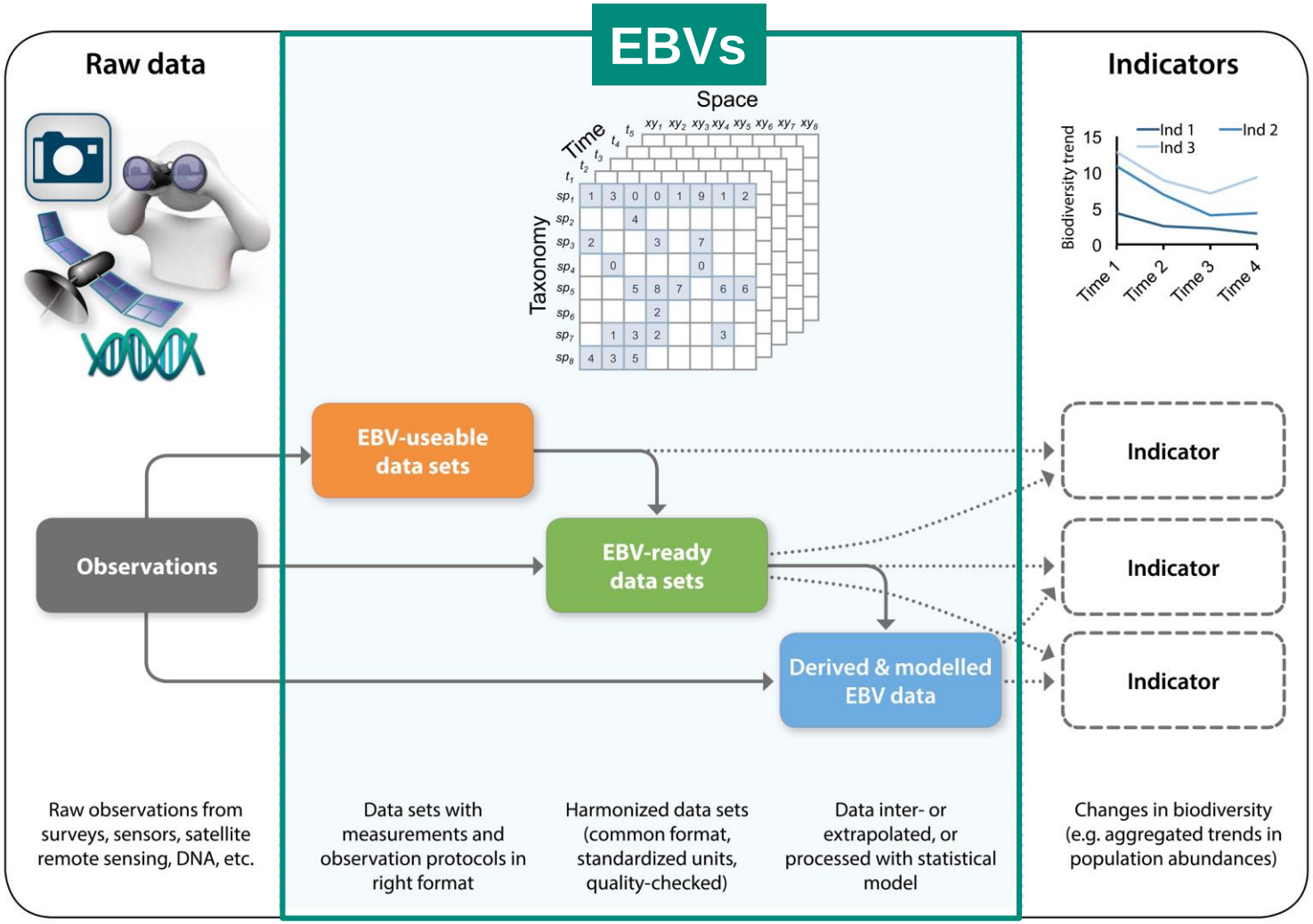
# Essential Biodiversity Variables and Scenarios




Pereira, H.M., Ferrier S. et al (2013) *Science*

# Developing Essential Biodiversity Variables

EBVs: Minimum set of measurements, complementary to one another, that can capture major dimensions of biodiversity change.




## Users

National Governments

CBD

ipbes Science and Policy for People and Nature

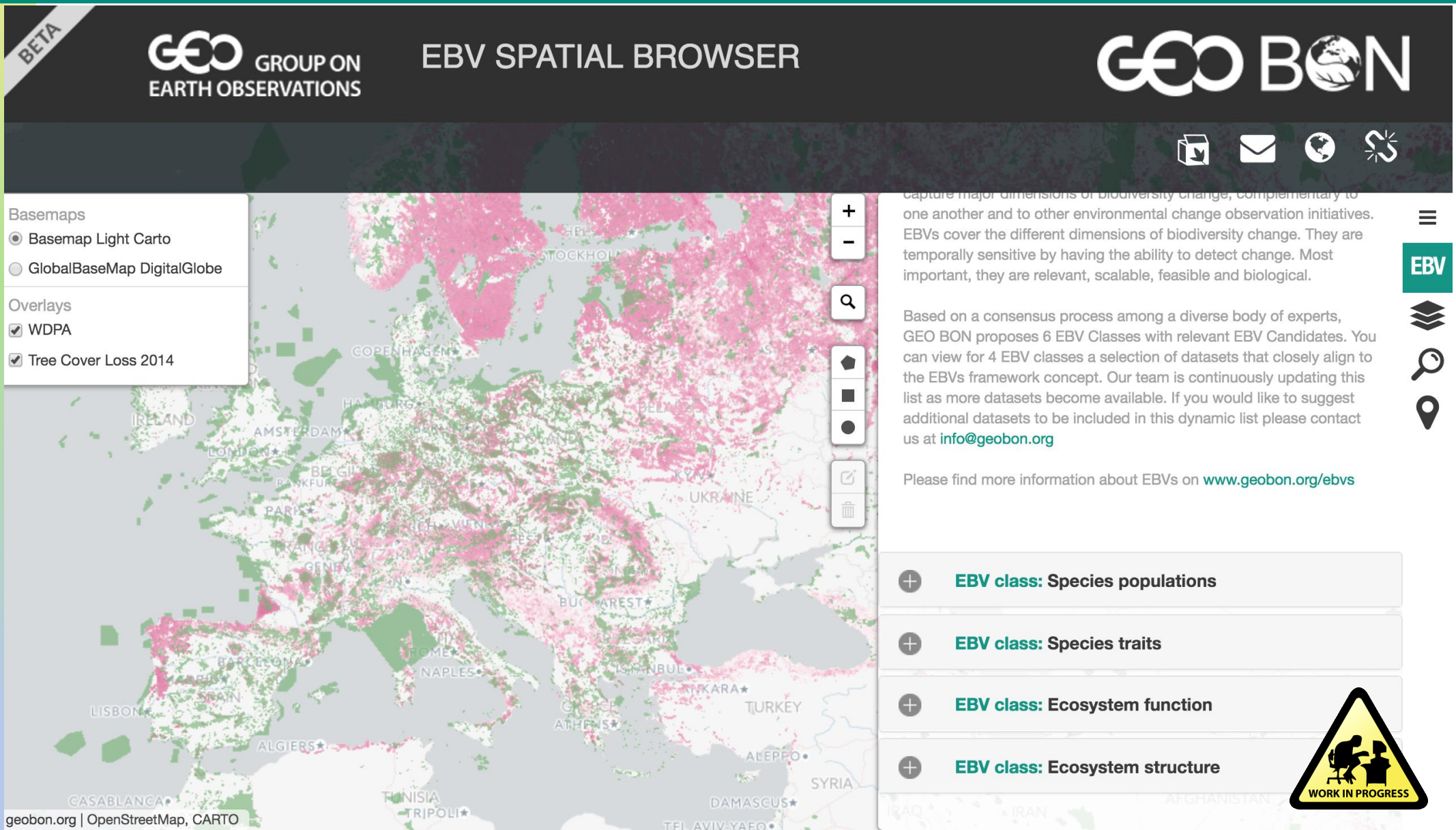
SUSTAINABLE DEVELOPMENT GOALS

Kissling et al., (2017
Biological Reviews

GEO BON

# Delivery of biodiversity related products to end-users

GEOSS
Global Earth Observation System of Systems



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# EBV based indicators: Integrating in situ and remote sensing observations for open access & real-time indicators

**SHI** Species Habitat Indices — MOL MAP OF LIFE


**Essential Biodiversity Variables:**
Species distributions
Ecosystem extent and fragmentation

**BHI** Biodiversity Habitat Index — CSIRO


**Essential Biodiversity Variables:**
Ecosystem extent and fragmentation
Taxonomic diversity

**SPI** Species Protection Index — MOL MAP OF LIFE


**Essential Biodiversity Variables:**
Species distributions
Ecosystem extent and fragmentation

**PARC** Protected Area Representativeness & Connectedness (PARC) Indices — CSIRO


**Essential Biodiversity Variables:**
Ecosystem extent and fragmentation
Taxonomic diversity

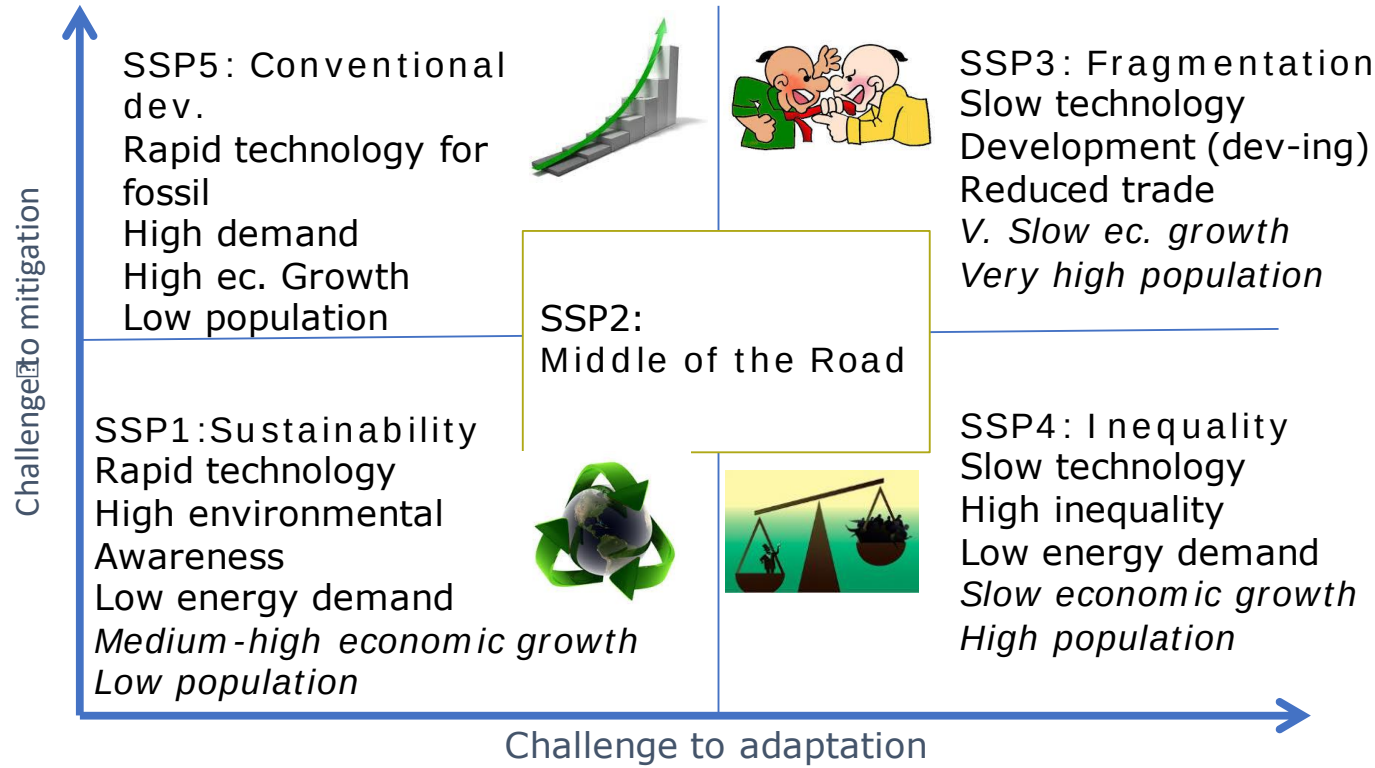
**GERI** Global Ecosystem Restoration Index — iDiv


**Essential Biodiversity Variables:**
Ecosystem extent
Net primary productivity

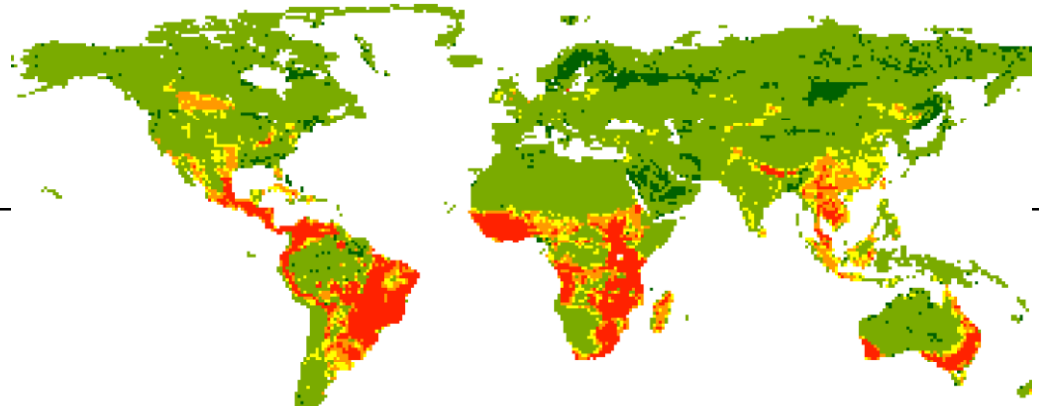
**SSII** Species Status Information Index — MOL MAP OF LIFE


**Essential Biodiversity Variables:**
Species distributions
Taxonomic diversity

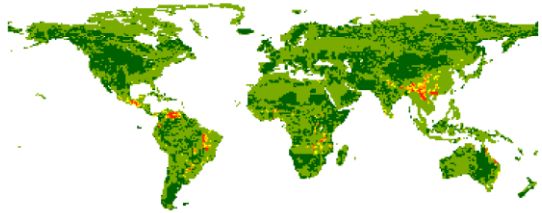
# EBVs based on BES scenario based inter-model comparison



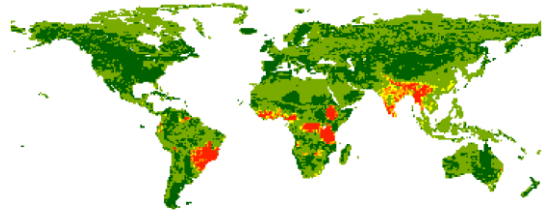

Historical



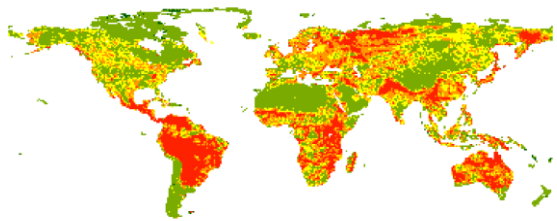
SSP1



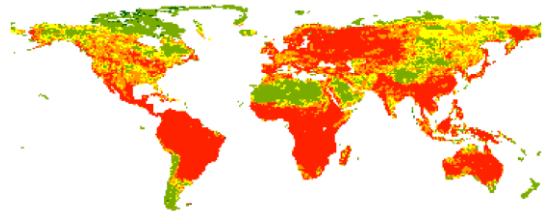
SSP1 x RCP2.6



SSP5



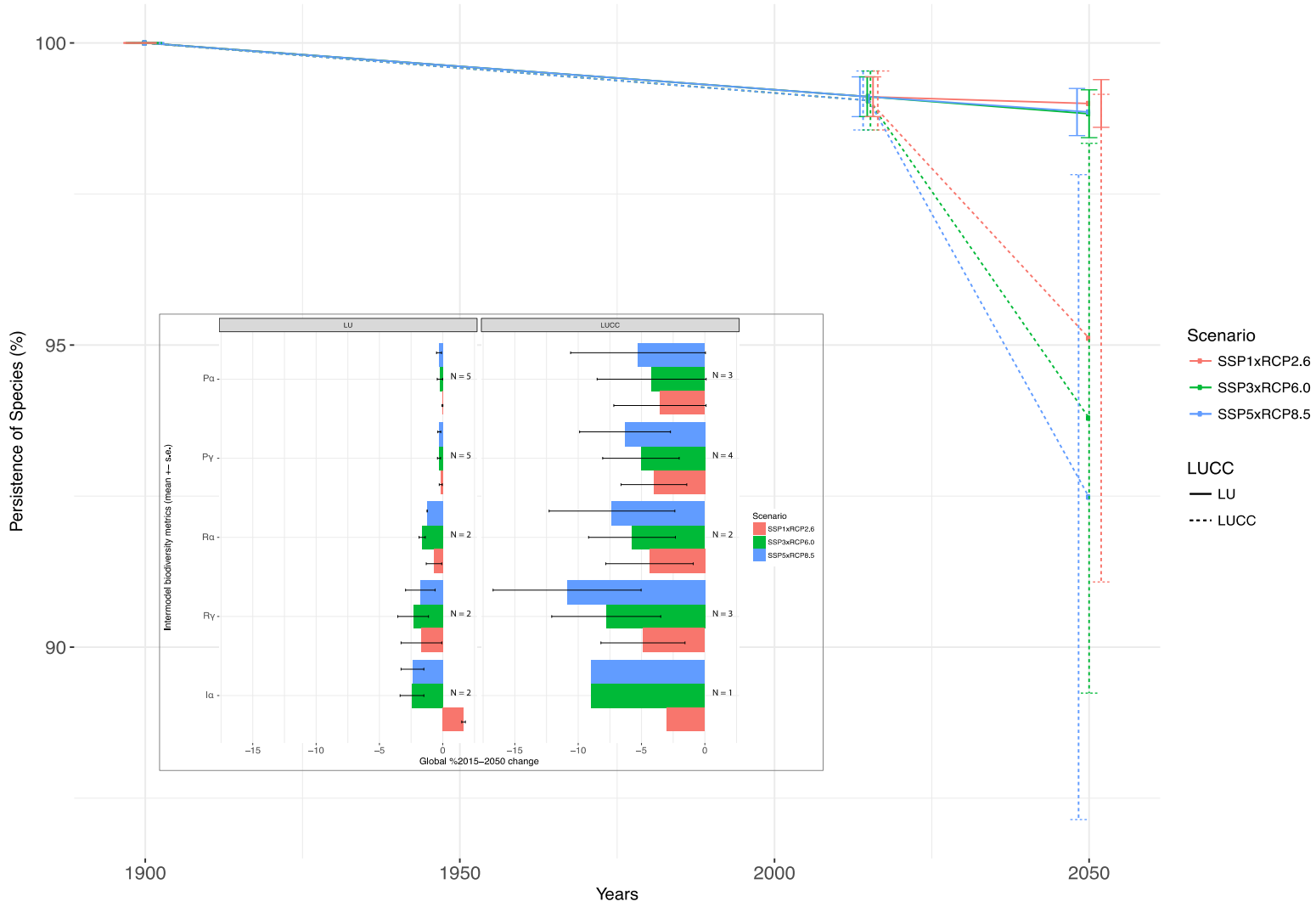
SSP5 x RCP8.5

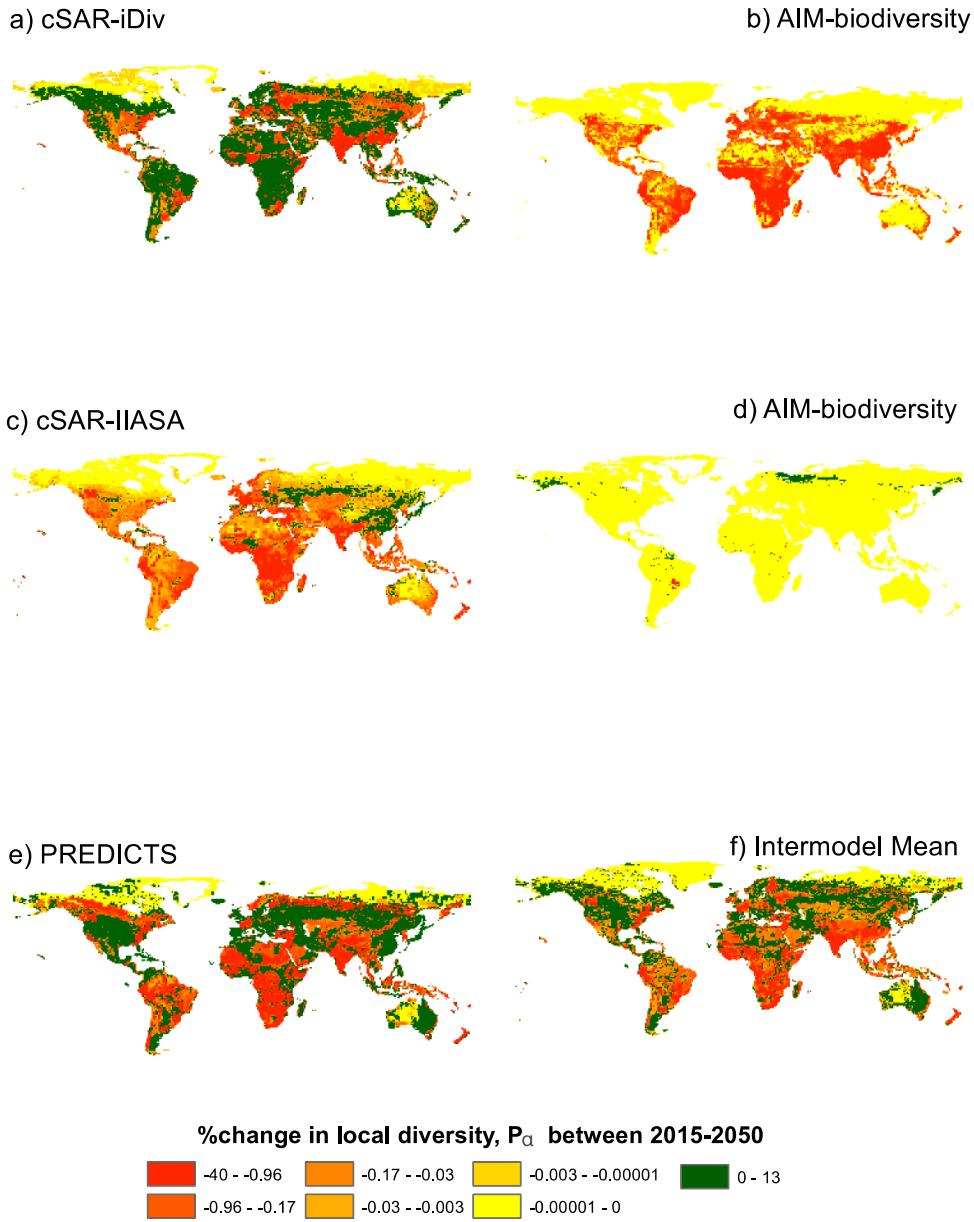


Mean Change in N **α**

-155.577 - -12.063 | -12.062 - -7.715 | -7.714 - -5.23 | -5.229 - 0 | 0.001 - 10

# Historical and future changes in biodiversity globally



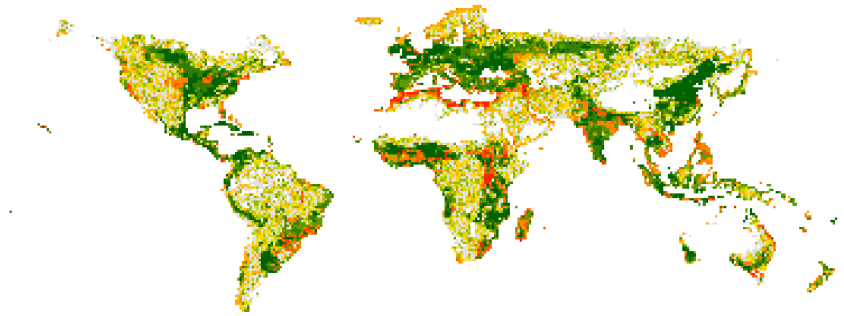

a) cSAR-iDiv
b) AIM-biodiversity
c) cSAR-IIASA
d) AIM-biodiversity
e) PREDICTS
f) Intermodel Mean
%change in local diversity, Pα between 2015-2050
-40 - -0.96
-0.96 - -0.17
-0.17 - -0.03
-0.03 - -0.003
-0.003 - -0.00001
-0.00001 - 0
0 - 13

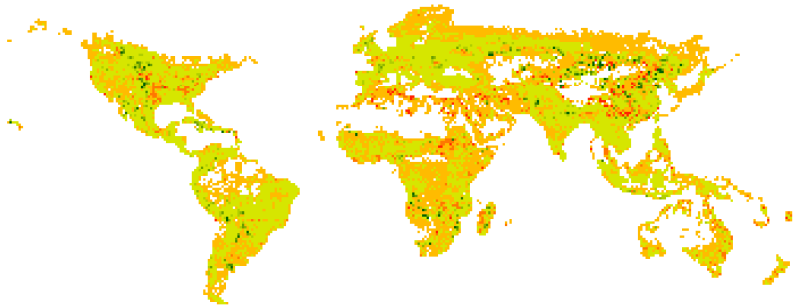
Delta
%2015-2050 (LU only)

Pollination (GLOBIO)

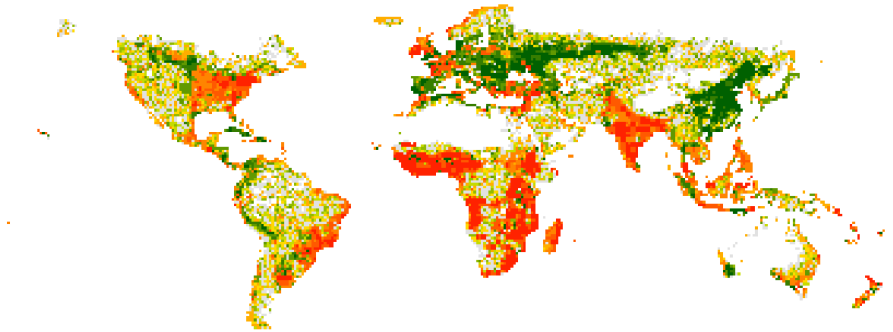
Pollination (InVEST)

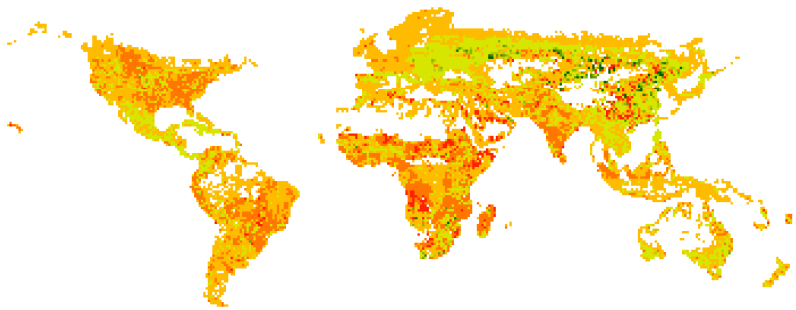
___SSP1





SSP3





*Thank you*