CIBER - Climate Impacts on Freshwater Biodiversity, Ecosystems and Resources

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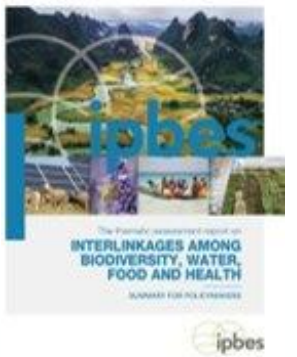
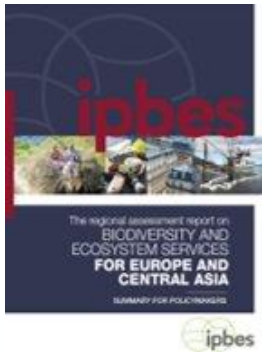
Project Objectives

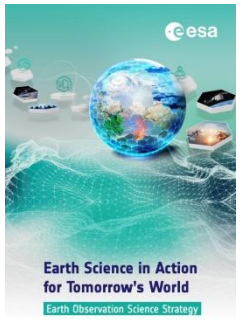
- **CIBER – a BIODIVERSITY-CLIMATE STUDIES project**
- Started in September 2025 and ongoing for 2 years
- General objective

  To develop, validate, and provide novel monitoring products on freshwater biodiversity informed from earth observation, scientific literature, and lake models with a major focus on fish communities, habitat templates, climate change and human impact.

- Policy connections
  - Targeting IPBES region Europe and Central Asia
  - Literature review focusing on IPBES Nexus Assessment, IPBES-IPCC report, IPBES regional assessment
  - ESA Earth Observation Science Strategy
  - KCEO Deep Dive – EO in support of EU policies for Biodiversity





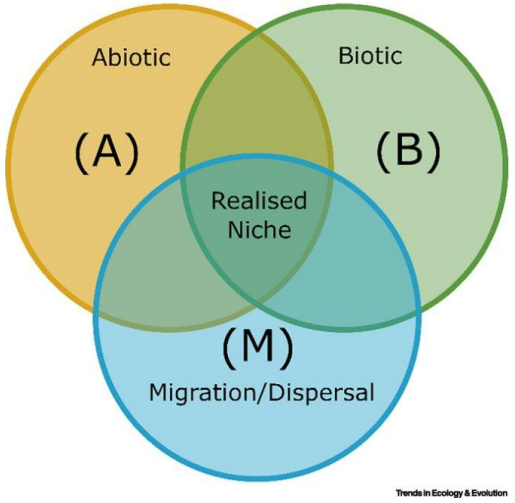


Scientific framework

CIBER aims to develop a Species Distribution Model describing the ecological niche for inland fish species across Europe and Central Asia. Combining knowledge on environmental tolerances, functional requirements, and species environment relationships, forming a basis for linking fish biodiversity to lake habitat features derived from satellite data and models.

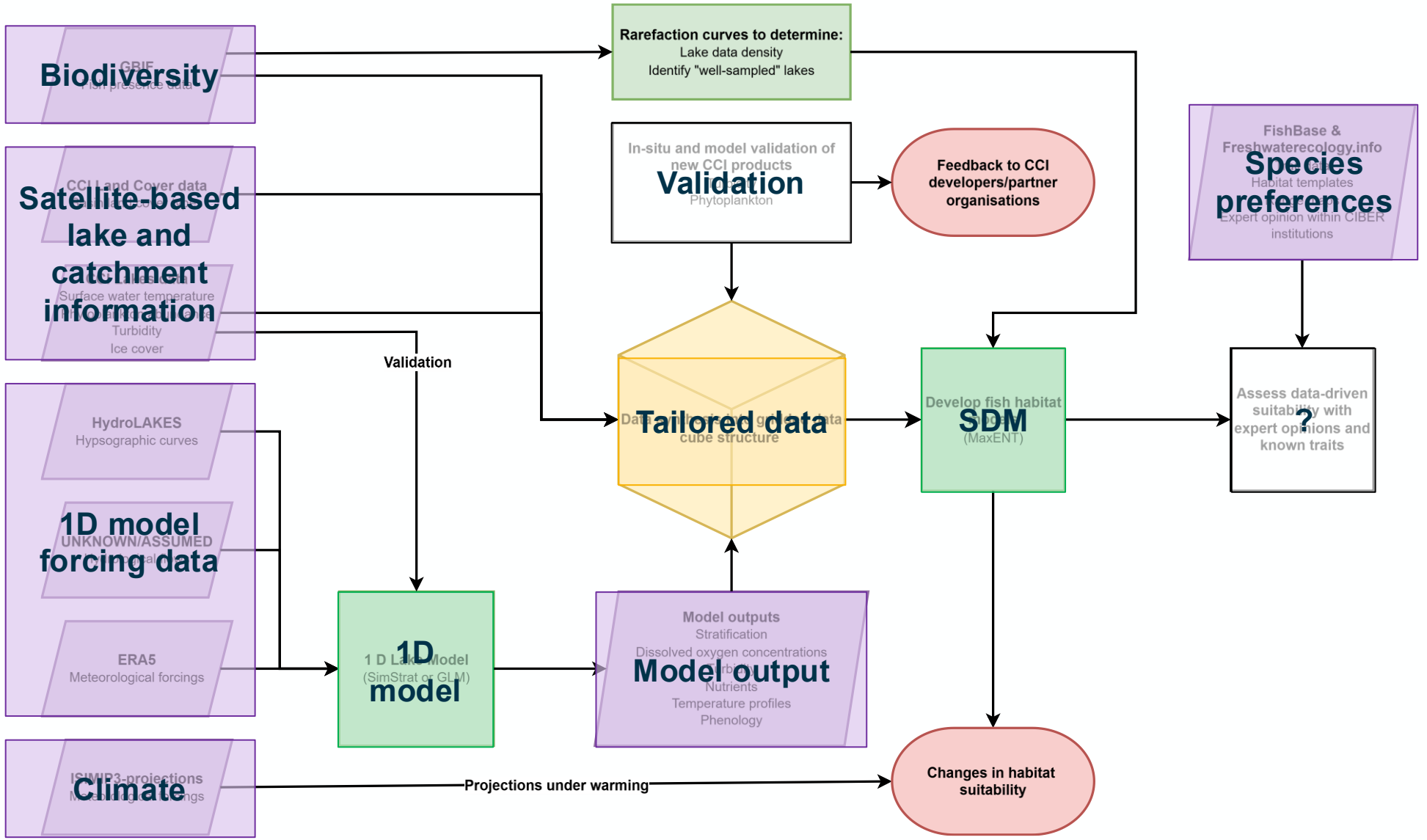
Building blocks:

- Satellite-based lake and catchment information (LSWT, chlorophyll, turbidity)
- 1D lake model products simulating water column processes (thermal structure; stratification, mixing,)
- Biodiversity data on fish species occurrence



Together they allow the derivation of scalable freshwater habitat lake indicators for fish biodiversity

Overview of the approach



ECVs being used

Targeting ESA CCI Lakes products, adding own processing where needed, plus catchment related information

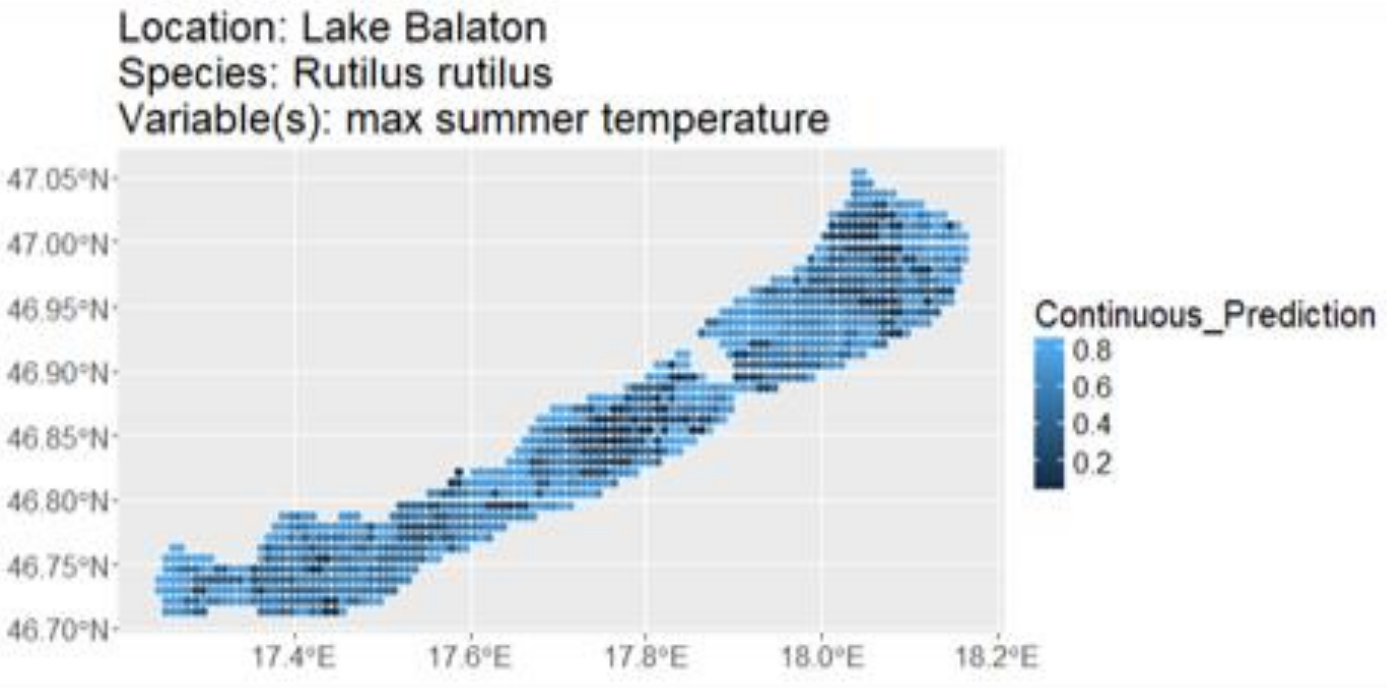
- Main parameters serving as lake habitat descriptors:

Parameter	Data Source	Processing
Surface water temperature	**ESA Lakes CCI v2.2/3 (LSWT)**	Data access
Deep water temperature	1D lake hydrophysical models simulations	Own processing
Oxygen	1D lake hydrophysical models simulations and empirical oxygen model	Own processing
Turbidity/Transparency	**ESA Lakes CCI v2.2/3 (Turbidity)**	Data access
Phytoplankton abundance	**ESA Lakes CCI v2.2/3 (Chlorophyll)**	Data access
Cyanobacteria abundance	**ESA Lakes CCI v2.2/3 (cyanobacteria index) + own processing**	Data access + own processing
Phenology	BGB phenology algorithm	Own processing
Bathymetry	Modelling, HydroLAKES	Data access + own processing
Morphology	CLMS Riparian Zones	Data access
Zonation/Basins	ESA CCI Land Cover, HydroLAKES, ISIMIP	Data access
Lake ice cover	**ESA Lakes CCI (LIC)**	Data access

First results

- Data inventory generated, including more than 100 potentially useful datasets – EO, modelled or combined
  - Started tailoring of selected datasets for SDM use, e.g. temporal and spatial aggregations
- GBIF data curation for CCI Lakes + analysis of species richness in relation to sampling effort
- Automated workflow implemented for running 1D lake model (GLM) for CCI lakes.
  - *Meterological forcings*
  - *Bathymetry information*
  - *Adding model for oxygen depletion*
- Species Distribution Model (Maximum Entropy Model) implemented and tested.

Common roach



Thank you

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climate impacts
on freshwater biodiversity,
ecosystems and resources