Climate Change

Sectoral Information System (SIS) Global Biodiversity

Eline Vanuytrecht (VITO)

EUROPARC webinar 21 April 2022

Copernicus Europe's eyes on Earth | European Commission | ECMWF | vito

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Overview

Context

SIS Biodiversity

→ Illustrative use cases

→ The making-off

Bioclimate datasets

Interactive applications

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SIS Biodiversity

Context

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Biodiversity is the variety of life

Biodiversity is the variety of life

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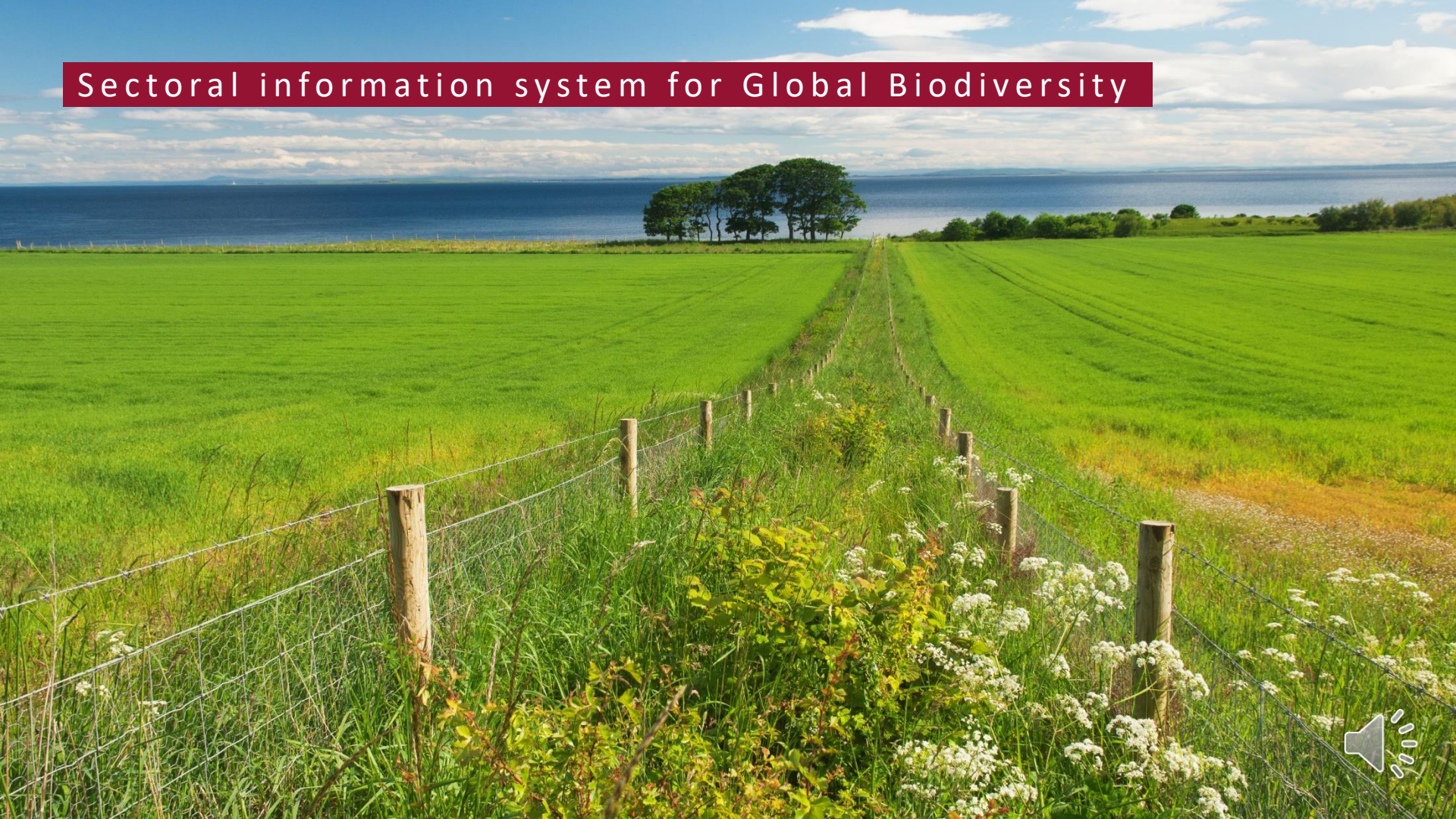
Biodiversity is the variety of life

Biodiversity is in decline…
…and climate change plays an important role

Climate data to tackle biodiversity loss

Sectoral information system for Global Biodiversity



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SIS Biodiversity

Service

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SIS Biodiversity

Aim: Unlocking Copernicus Climate Data Store's extensive climate dataset to biodiversity community

Global datasets

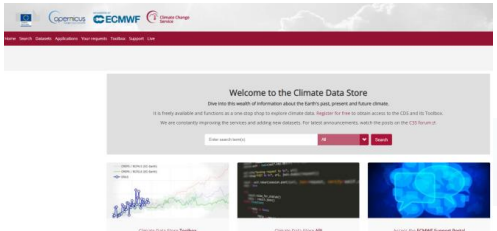
Illustrative use cases

High resolution datasets

Interactive applications

Co-creation with experts

Hosted in Copernicus Climate Data Store



European Commission

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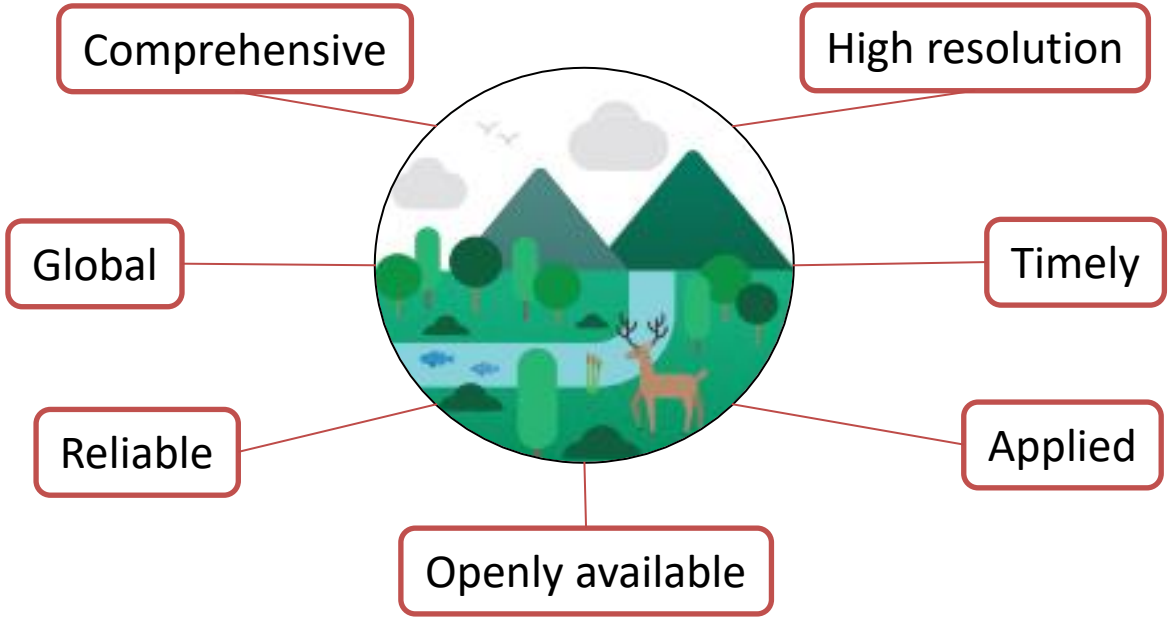
SIS Biodiversity

Aim: Unlocking Copernicus Climate Data Store's extensive climate dataset to biodiversity community



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SIS Biodiversity: use cases

Pelagic fish

Baltic seals

Grassland ecosystems

Goldenheaded lion tamarins

Tropical forest restoration

European hedgerows

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SIS Biodiversity

The making-off

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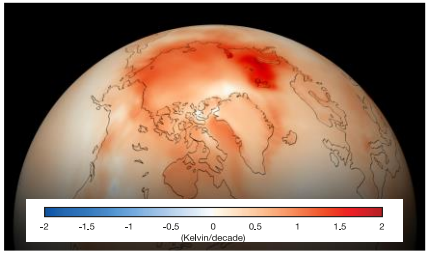
SIS Biodiversity: the making-off

Climate Change

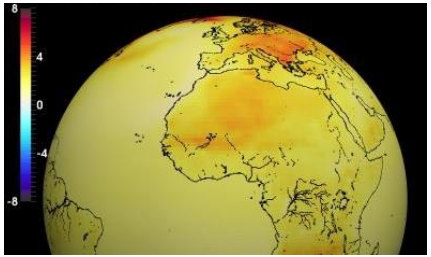
PROCESS

Reanalysis: recent climate (ERA5)

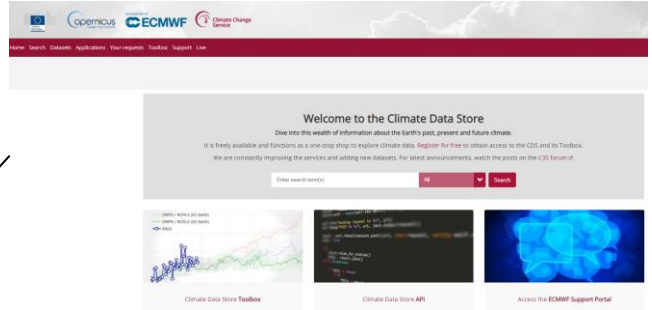


1979-2018

Future climate: CMIP projections

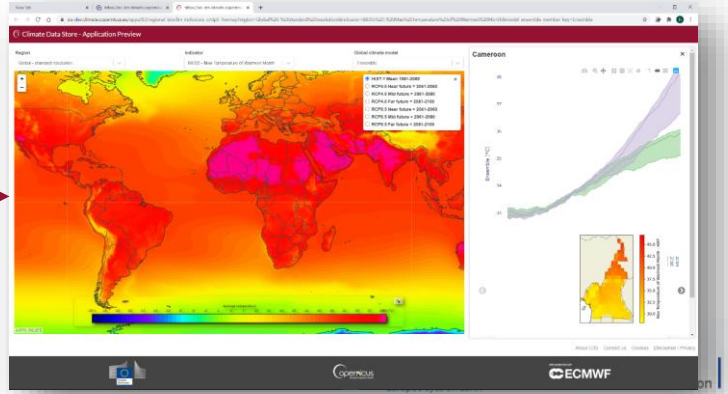


21st century



- Bias correction du bias
- Calculation: climate variables → bioclimate indicators
- Downscaling

Climate Service for Biodiversity



SIS Biodiversity: the making-off

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PROCESS

questionnaires

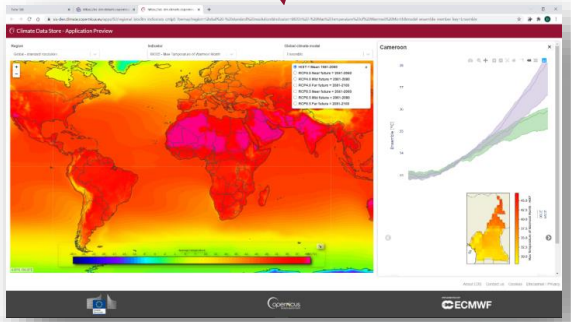
6 workshops

Synthesis

- 100+ participants
- Local

Bilateral interviews (IUCN, DG, ...)

Climate Service for Biodiversity



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Datasets

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SIS Biodiversity: datasets

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Search results

Biodiversity

Sort by
- Relevancy
- Title

- Product type
- Variable domain
- Spatial coverage
- Temporal coverage
- Sector
- Provider

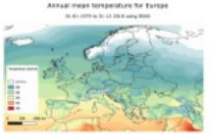
All | Applications | Datasets | Providers

Showing 1-4 of 4 results for Biodiversity ×

Downscaled bioclimatic indicators for selected regions from 1979 to 2018 derived from reanalysis

Dataset | Biodiversity | Reanalysis | Global | Land (biosphere)

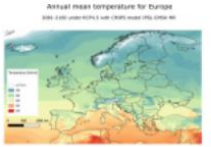
climate affects ecosystems, the services they deliver, and nature's **biodiversity**. They are specifically



Downscaled bioclimatic indicators for selected regions from 1950 to 2100 derived from climate projections

Dataset | Biodiversity | Global | Land (biosphere)

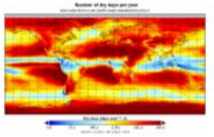
bioclimatic indicators is specifically relevant for applications within the **biodiversity** and ecosystem



Global bioclimatic indicators from 1950 to 2100 derived from climate projections

Dataset | Biodiversity | Global | Land (biosphere)

's **biodiversity**. They are specifically relevant for applications within the **biodiversity** and



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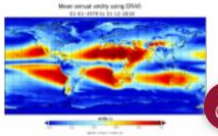

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Essential climate variables (12)	
Monthly mean precipitation	m s^{-1}
Annual mean daily precipitation	m s^{-1}
Annual maximum daily precipitation	m s^{-1}
Annual maximum temperature	K
Annual minimum temperature	K
Monthly mean and annual mean temperature	K
Monthly mean daily maximum temperature	K
Monthly mean daily minimum temperature	K
Annual mean daily maximum temperature	K
Annual mean daily maximum temperature	K
Monthly and annual water vapour pressure	Pa
Monthly and annual cloud cover	-

Bioclimate indicators as in WorldClim (19)	
Annual mean temperature (BIO01)	K
Mean diurnal range (BIO02)	K
Isothermality (BIO03)	-
Temperature seasonality (BIO04)	K
Maximum temperature in warmest month (BIO05)	K
Minimum temperature in coldest month (BIO06)	K
Temperature annual range (BIO07)	K
Mean temperature in wettest quarter (BIO08)	K
Mean temperature in driest quarter (BIO09)	K
Mean temperature in warmest quarter (BIO10)	K
Mean temperature of coldest quarter (BIO11)	K
Annual precipitation (BIO12)	m s^{-1}
Precipitation in wettest month (BIO13)	m s^{-1}
Precipitation in driest month (BIO14)	m s^{-1}
Precipitation seasonality (BIO15)	-
Precipitation in wettest quarter (BIO16)	m s^{-1}
Precipitation in driest quarter (BIO17)	m s^{-1}
Precipitation in warmest quarter (BIO18)	m s^{-1}
Precipitation in coldest quarter (BIO19)	m s^{-1}

Drought indicators (11)	
Annual mean aridity	-
Aridity in coldest quarter	-
Aridity in warmest quarter	-
Aridity in wettest quarter	-
Aridity in driest quarter	-
Dry days	days yr^{-1}
Maximum length of dry spells	days
Mean intensity of dry spells	days
Mean length of dry spells with min 5 days	days
Number of dry spells with min 5 days	spells yr^{-1}
Summer days	days yr^{-1}

Evaporation indicators (10)	
Annual mean potential evaporation	m s^{-1}
Potential evaporation in coldest quarter	m s^{-1}
Potential evaporation in warmest quarter	m s^{-1}
Potential evaporation in wettest quarter	m s^{-1}
Potential evaporation driest quarter	m s^{-1}
Annual mean evaporative fraction	-
Evaporative fraction in coldest quarter	-
Evaporative fraction in warmest quarter	-
Evaporative fraction in wettest quarter	-
Evaporative fraction in driest quarter	-

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Surface energy indicators (10)	
Annual mean surface latent heat flux	W m^{-2}
Surface latent heat flux in coldest quarter	W m^{-2}
Surface latent heat flux in warmest quarter	W m^{-2}
Surface latent heat flux in wettest quarter	W m^{-2}
Surface latent heat flux in driest quarter	W m^{-2}
Annual mean surface sensible heat flux	W m^{-2}
Surface sensible heat flux in coldest quarter	W m^{-2}
Surface sensible heat flux in warmest quarter	W m^{-2}
Surface sensible heat flux in wettest quarter	W m^{-2}
Surface sensible heat flux in driest quarter	W m^{-2}
Soil indicators (5)	
Annual mean volumetric soil water layer 1	m^3 m^{-3}
Volumetric soil water layer 1 in coldest quarter	m^3 m^{-3}
Volumetric soil water layer 1 in warmest quarter	m^3 m^{-3}
Volumetric soil water layer 1 in wettest quarter	m^3 m^{-3}
Volumetric soil water layer 1 in driest quarter	m^3 m^{-3}
Marine indicators (2)	
Sea surface temperature	K
Sea ice concentration	-
Growing season specific indicators (6)	
Frost days	days
Growing degree days	K days yr^{-1}
Growing season start	day since 1 Jan
Growing season end	day since 1 Jan
Growing degree days during growing season	K days
Köppen-Geiger class	-
Wind indicators (3)	
Zonal wind speed	m s^{-1}
Meridional wind speed	m s^{-1}
Wind speed	m s^{-1}

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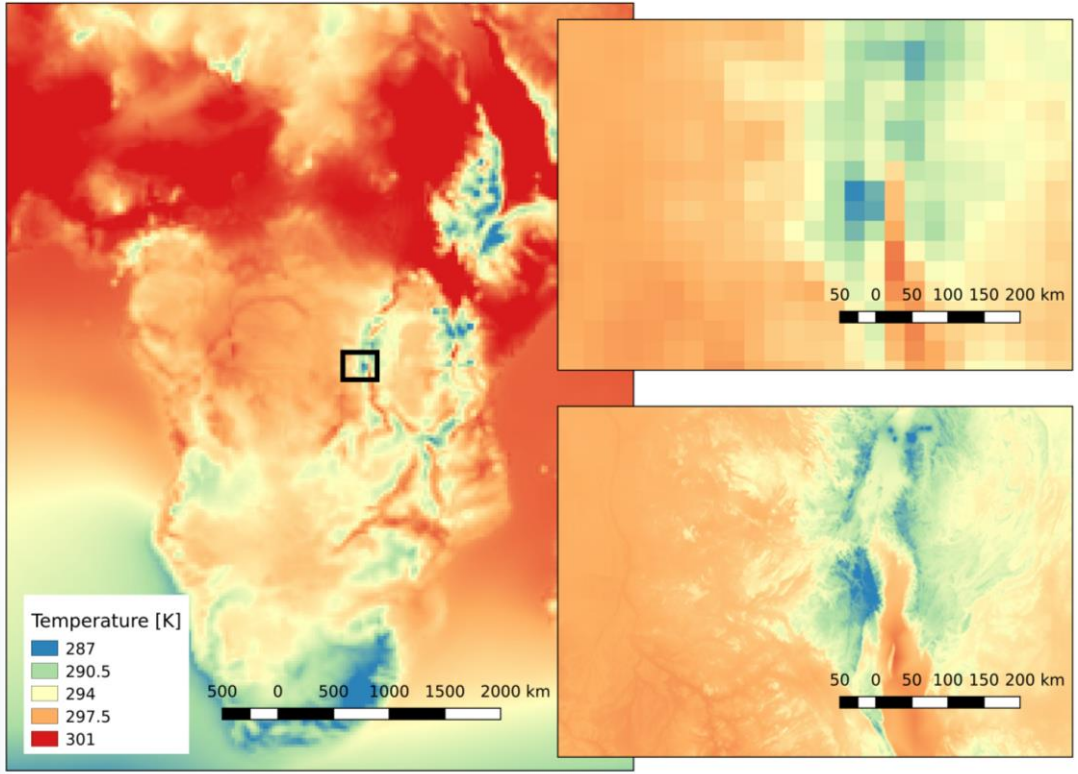
SIS Biodiversity: high resolution datasets



Basic resolution (50 km)

High resolution (1 km) based on topographical information

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SIS Biodiversity

Applications

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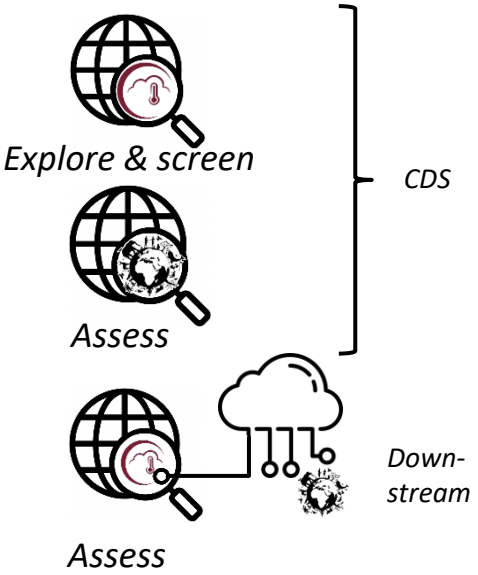
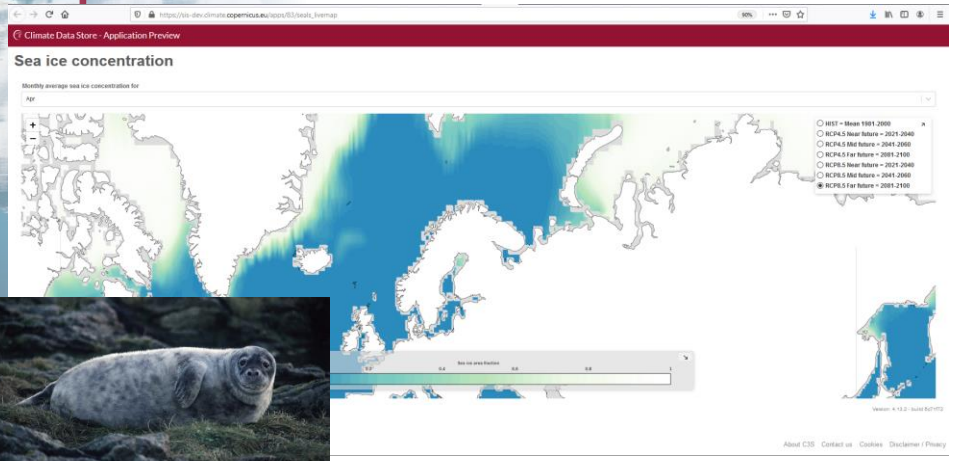
SIS Biodiversity: applications

1. Bioclimate indicator and climate suitability explorer

2. Thermal suitability for fish species habitat
3. Sea ice concentration
4. Climate suitability for xeric grasslands
5. Climate suitability for hedgerow species

6. Climate suitability for tamarin habitat in Brazil
7. Climate suitability for tree restoration in Central Africa





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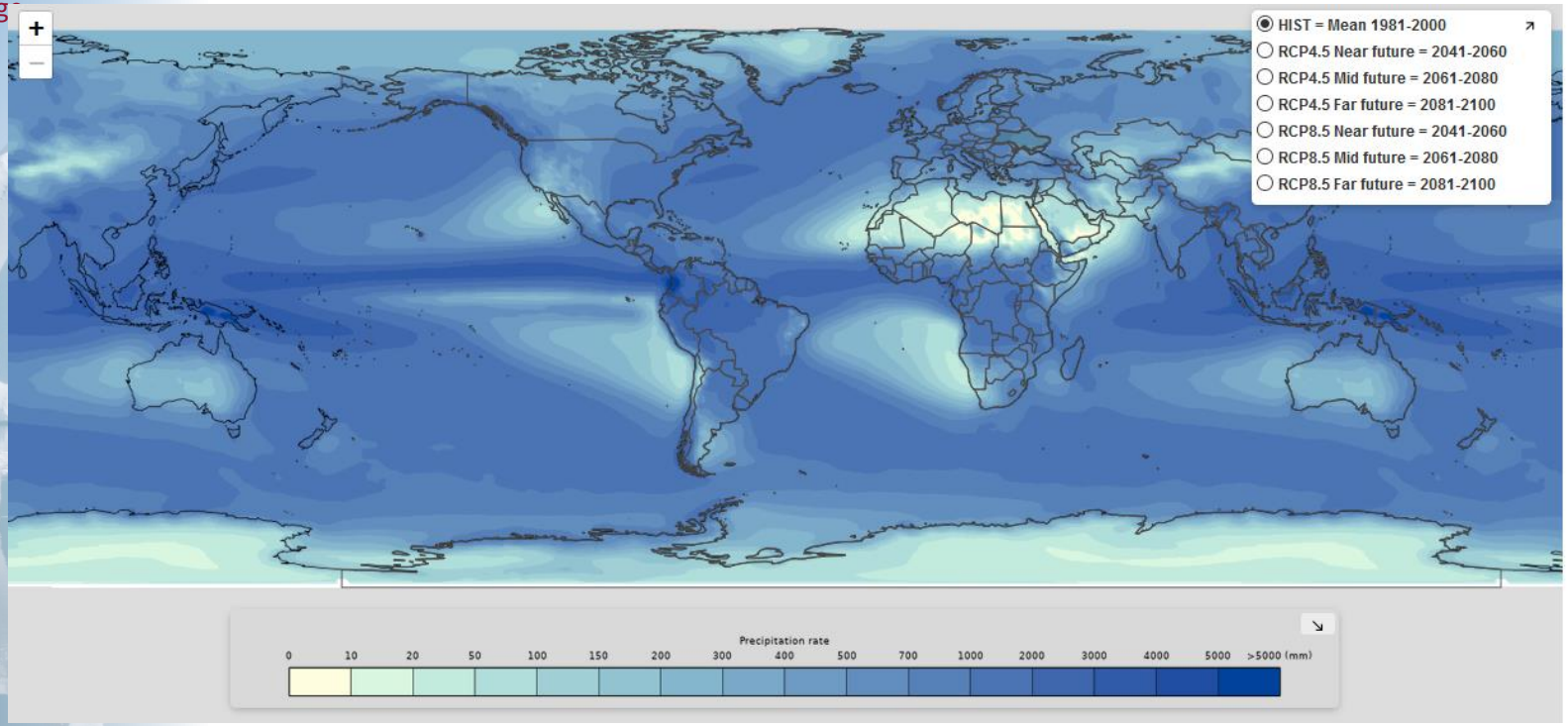
Bioclimate indicator and suitability explorer



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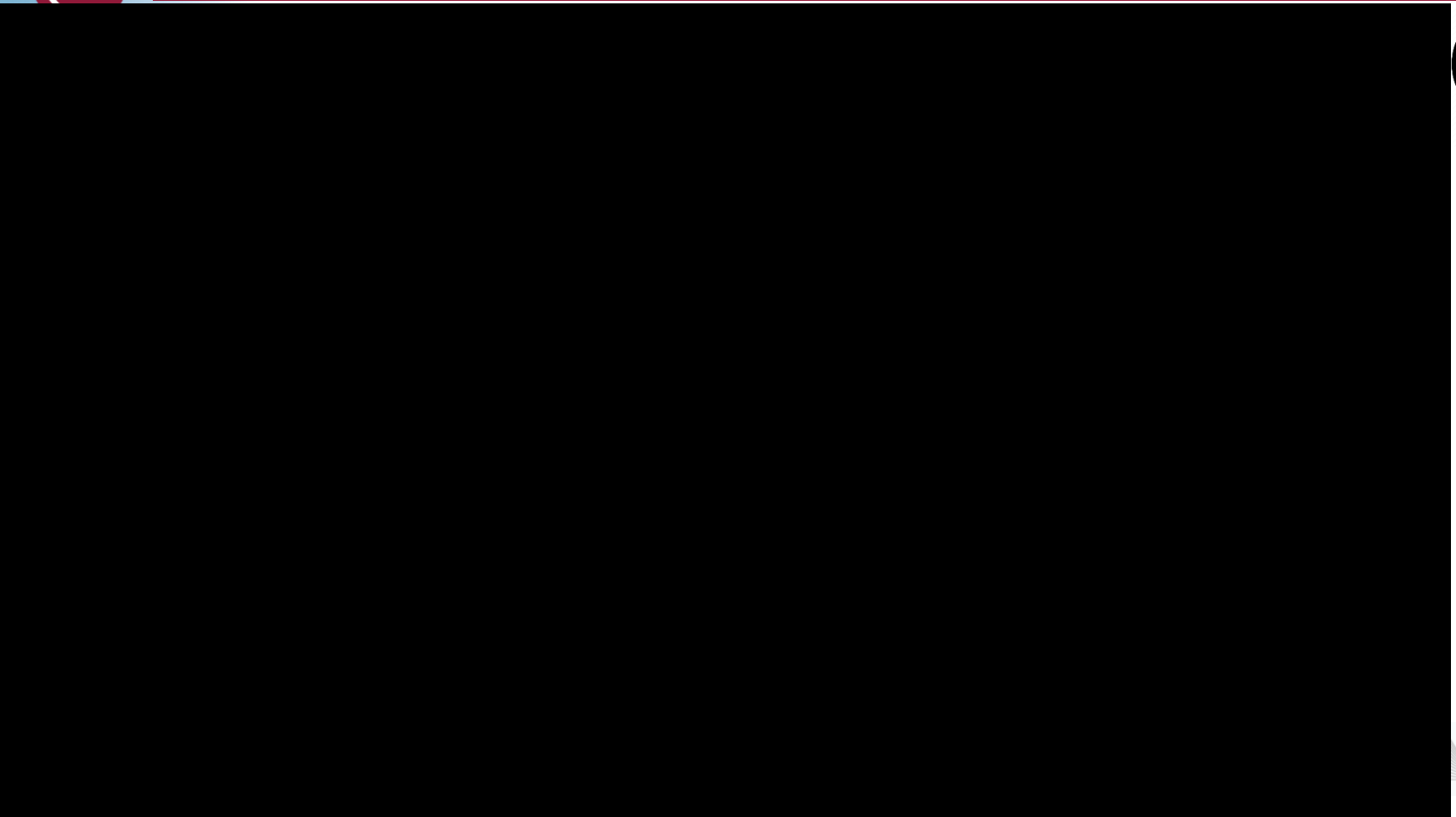
Bioclimate indicator and suitability explorer



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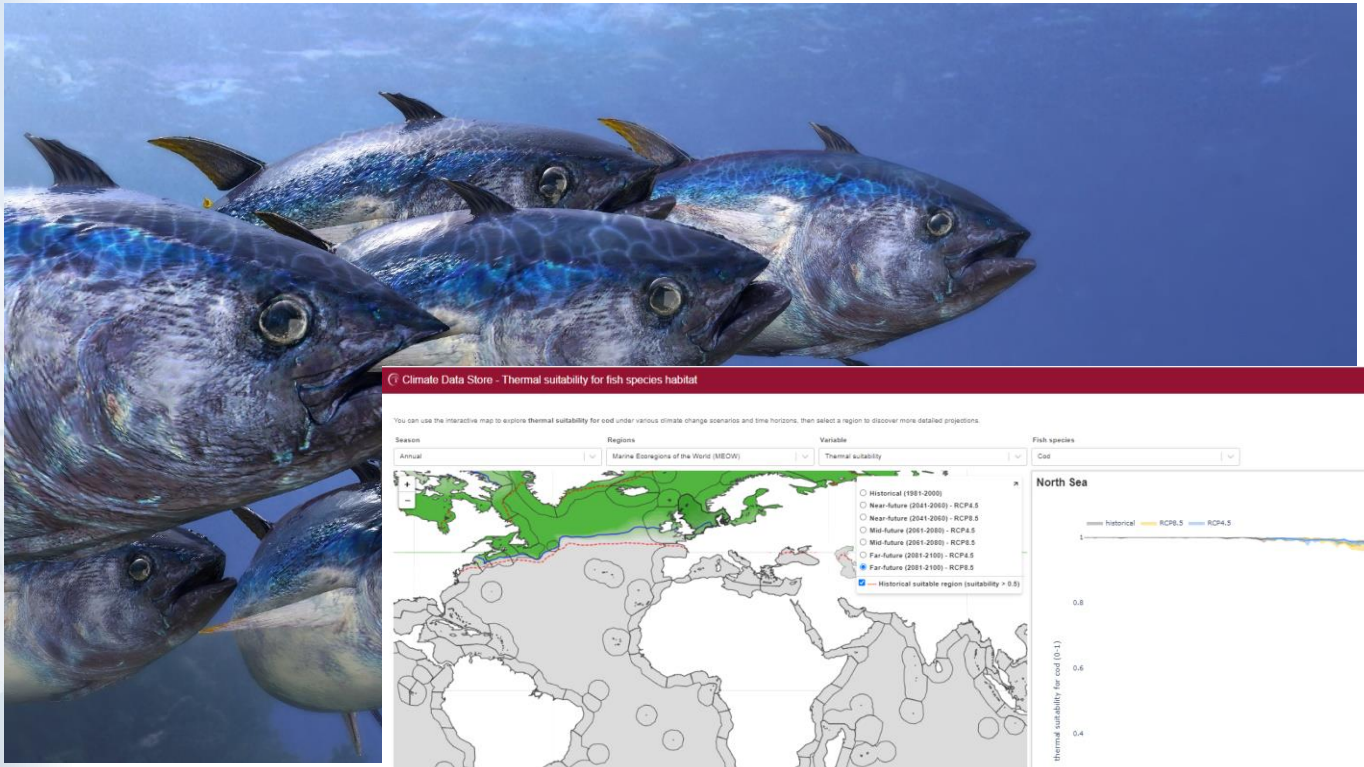
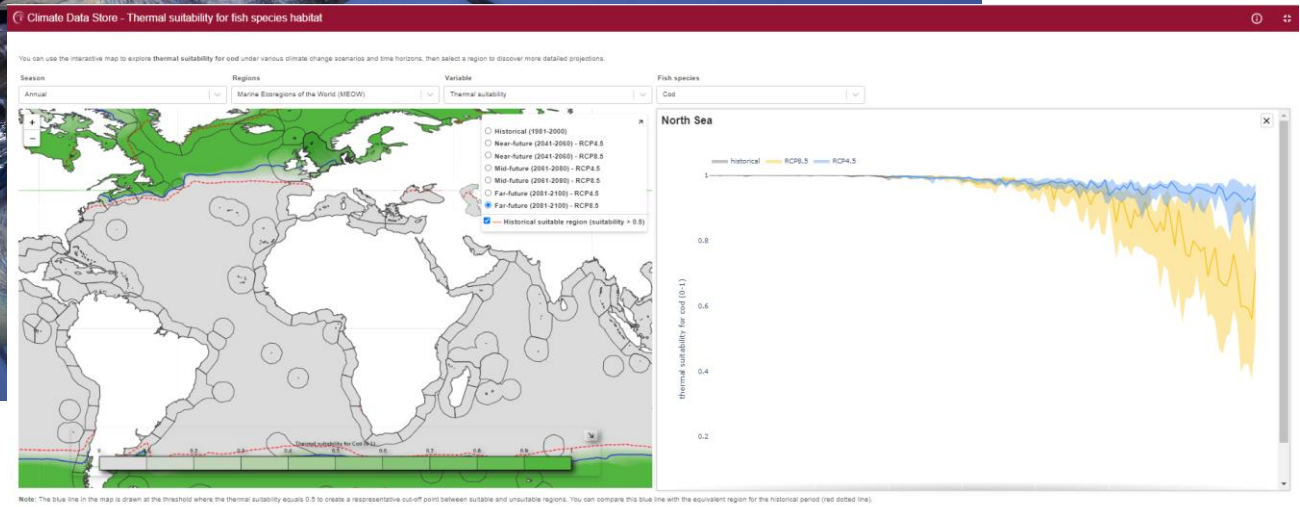
Thermal suitability for fish species habitat app





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Thermal suitability for fish species habitat app

Clim
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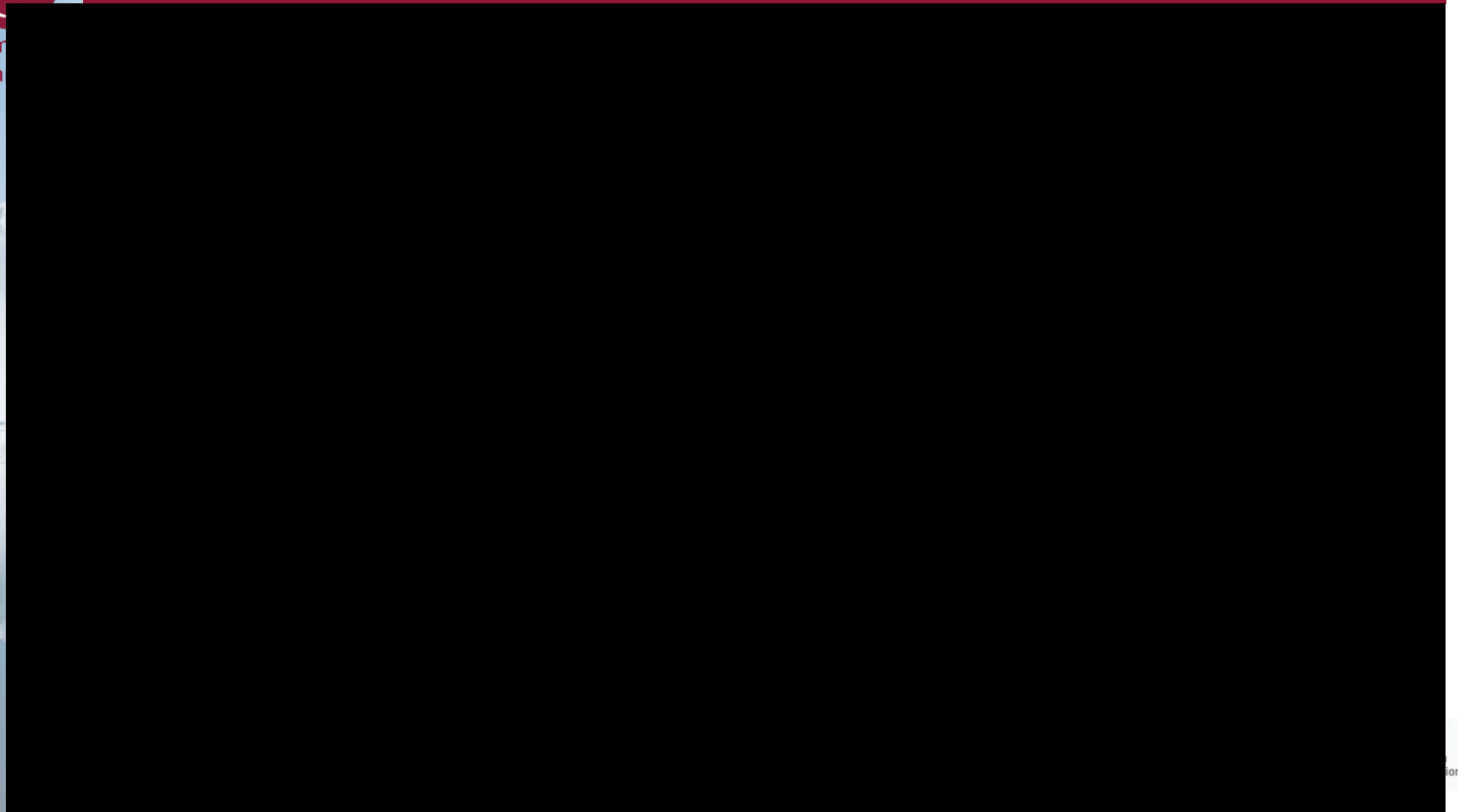
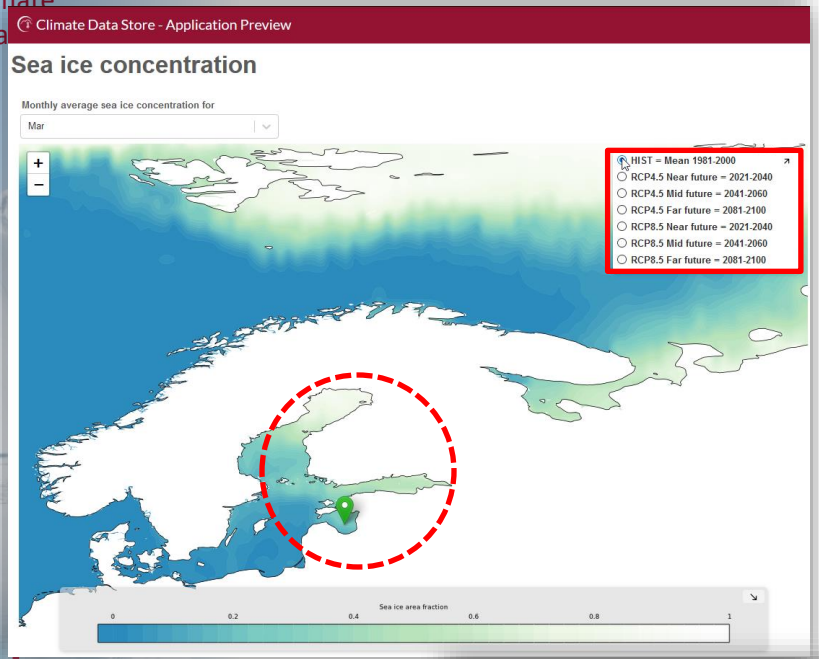
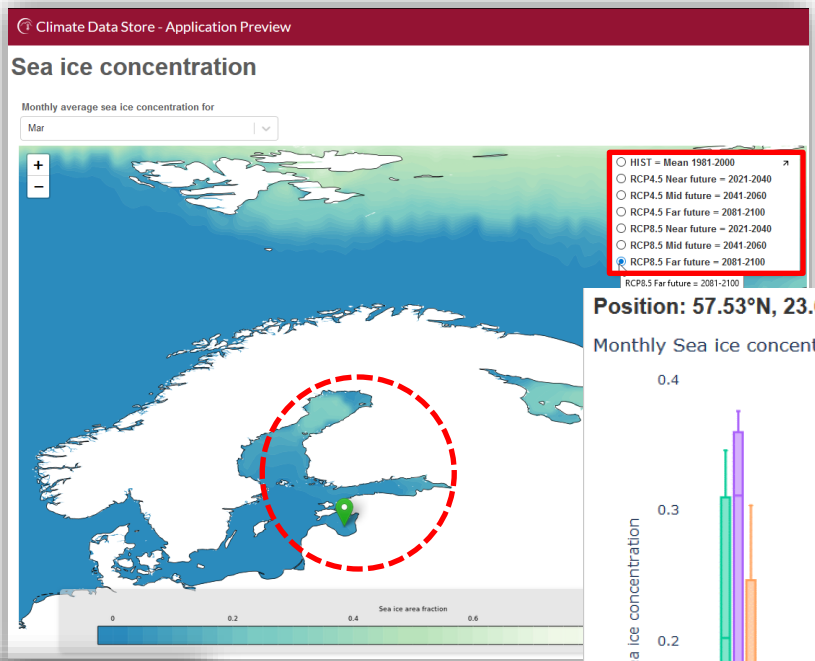
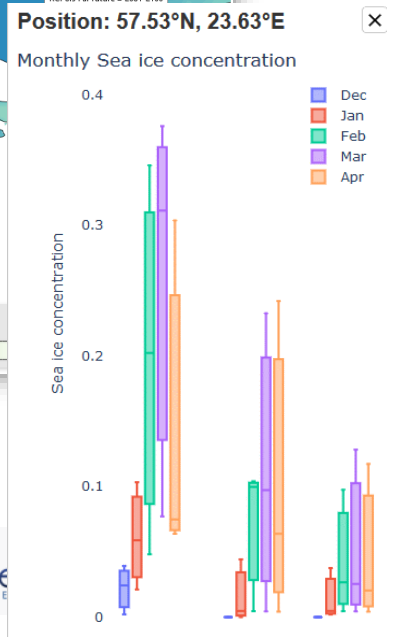


Sea ice concentration app

Climate
Cha



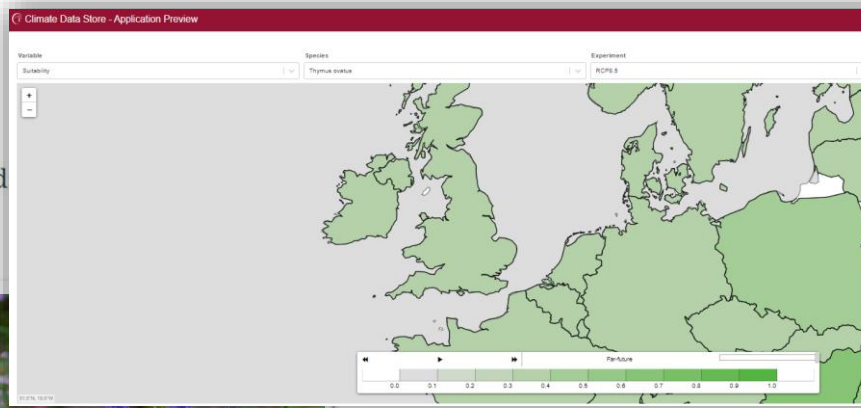




Climate suitability for xeric grasslands app

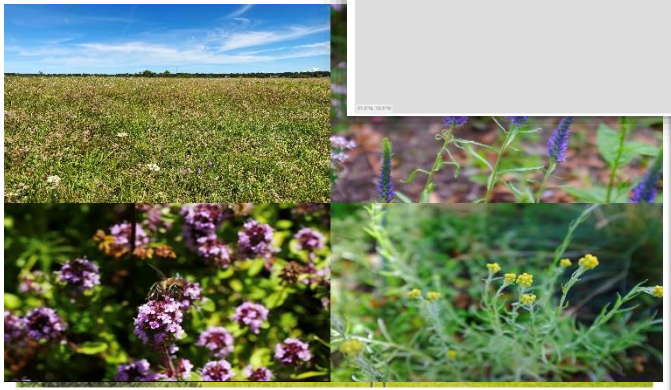
Climate change and semi-natural grasslands

The impact of climate change on semi-natural grassland
Latvia: Copernicus SIS Biodiversity use case



Semi-natural grasslands also provide a high number of direct and indirect contributions to human well-being or **ecosystem services (ES)**. Some of ES are easy to see and understand - like food for grazing animals, medical herb provision or honey production. Some of the services are more difficult to scope - like soil erosion control and air purification. Nevertheless, both visible and invisible services are vital for human well-being.

ES and human well-being



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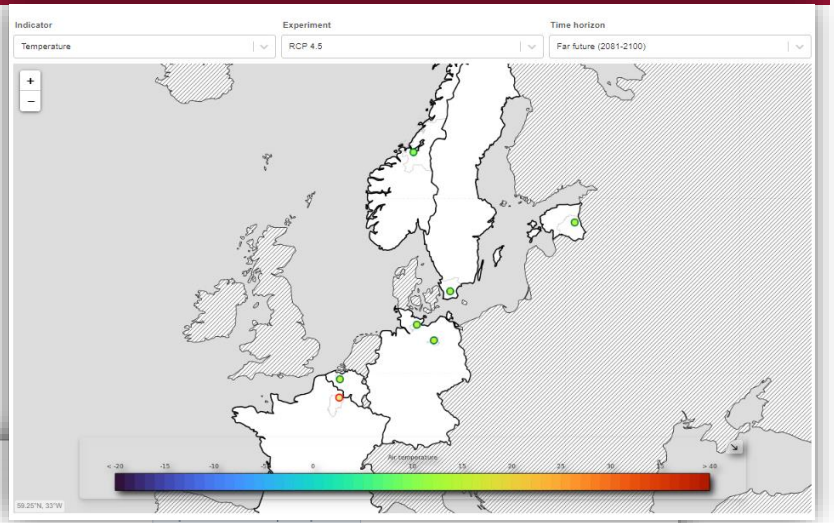
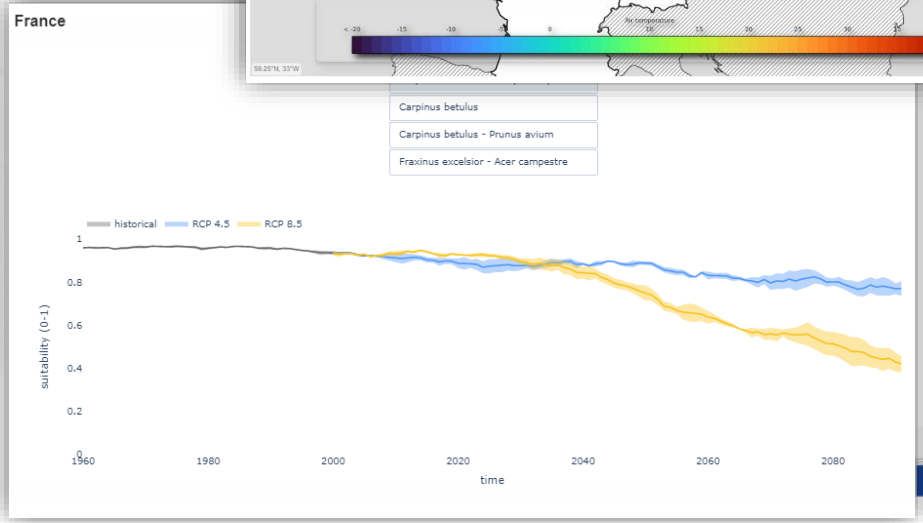
Climate suitability for hedgerow species app





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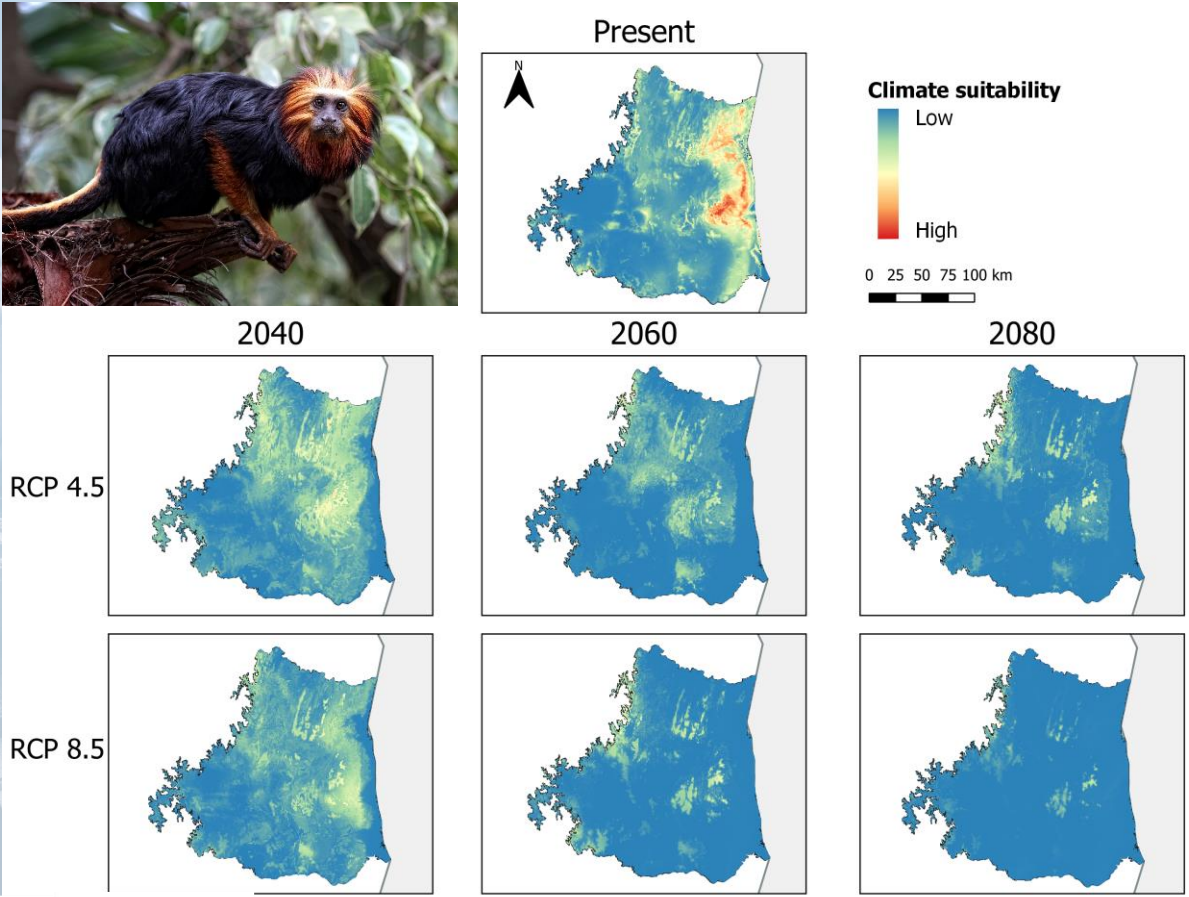
Climate suitability for tamarin habitat



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Climate suitability for tree restoration in Africa

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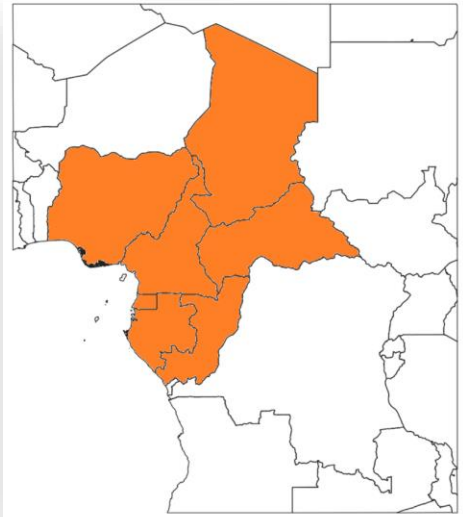
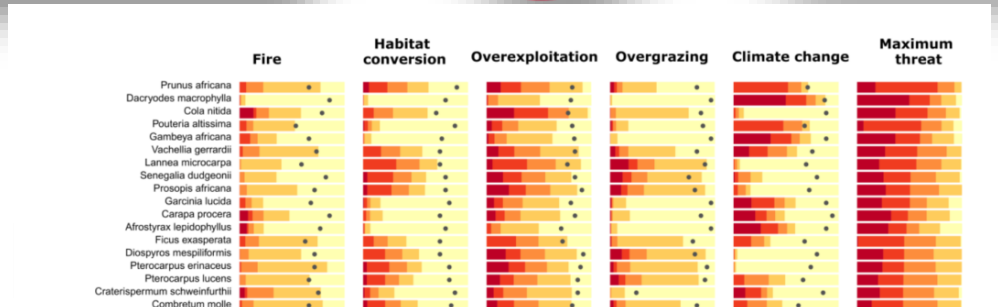


Native trees of Central Africa

- Study conducted in **Central Africa** (Cameroon, Nigeria, Chad, Central African Republic, Equatorial Guinea, Gabon, Republic of Congo)
- **50 native trees species** used in restoration and important for their uses, ecosystem services, gender, livelihoods and conservation...
- Modelling of **current** and future distribution under **climate change**



Ceccarelli et al. 2022.
Biological Conservation

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Questions?

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