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Copernicus
Europe's eyes on Earth

Emergency Management

European Commission

Anticipating & Monitoring Drought

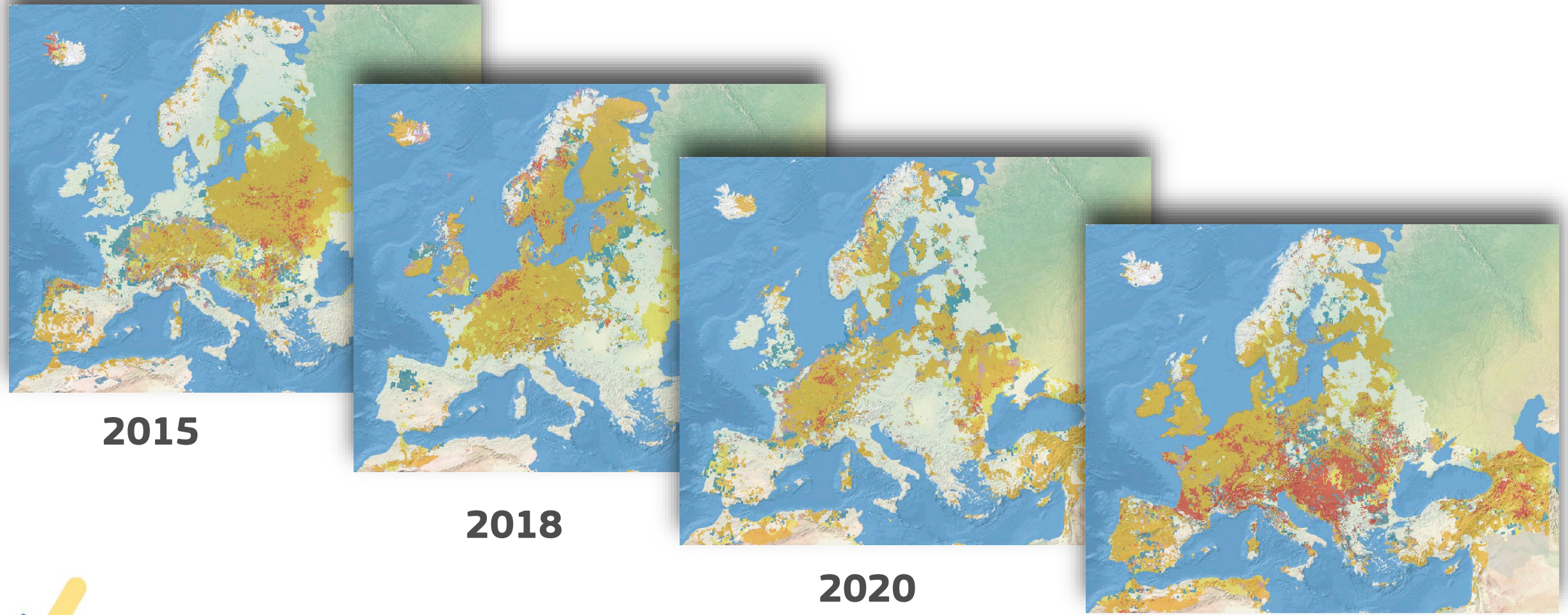
Andrea Toreti

European Commission Joint Research Centre

Integrating Disaster Risk Data in Policy

13 October 2023

Droughts affect the entire Europe



2015

2018

2020

2022

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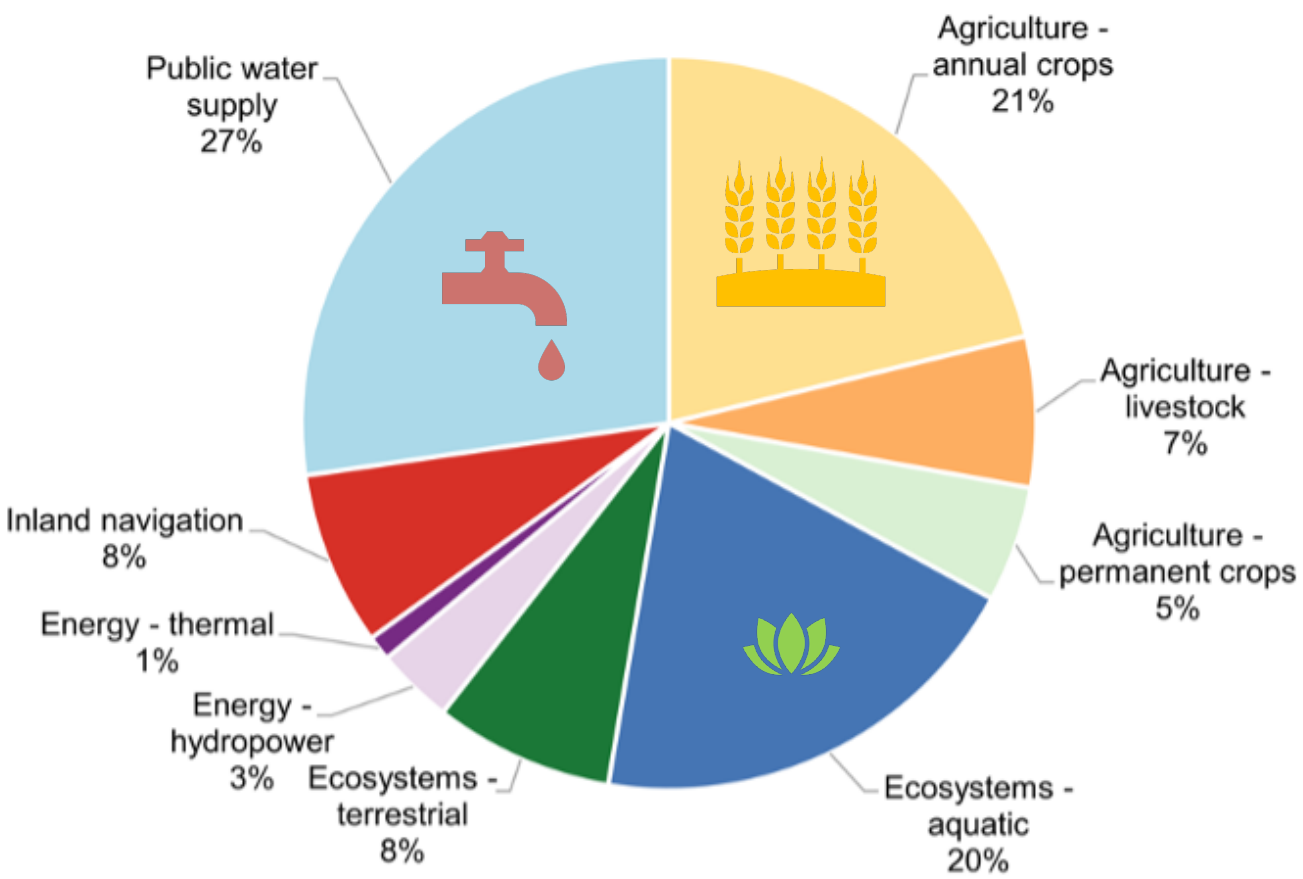
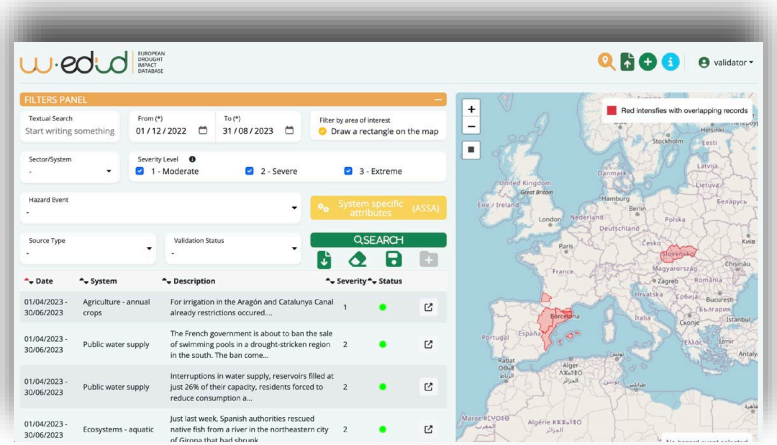
Droughts affect all sectors and ecosystems





European **D**rought **I**mpact **D**atabase

1970-2022

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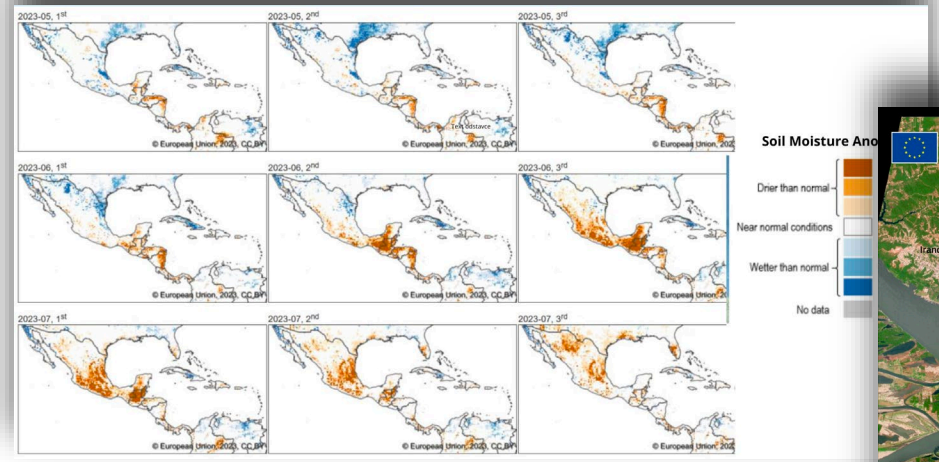
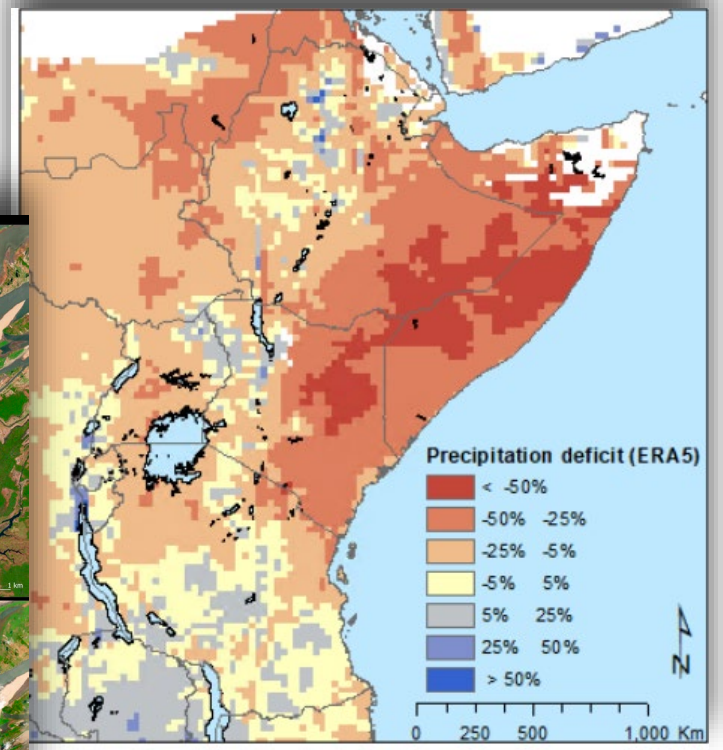
A call for global actions



Central America & Mexico 2023

Amazon 2023



Precipitation deficit East Africa (July 2020 – June 2022)

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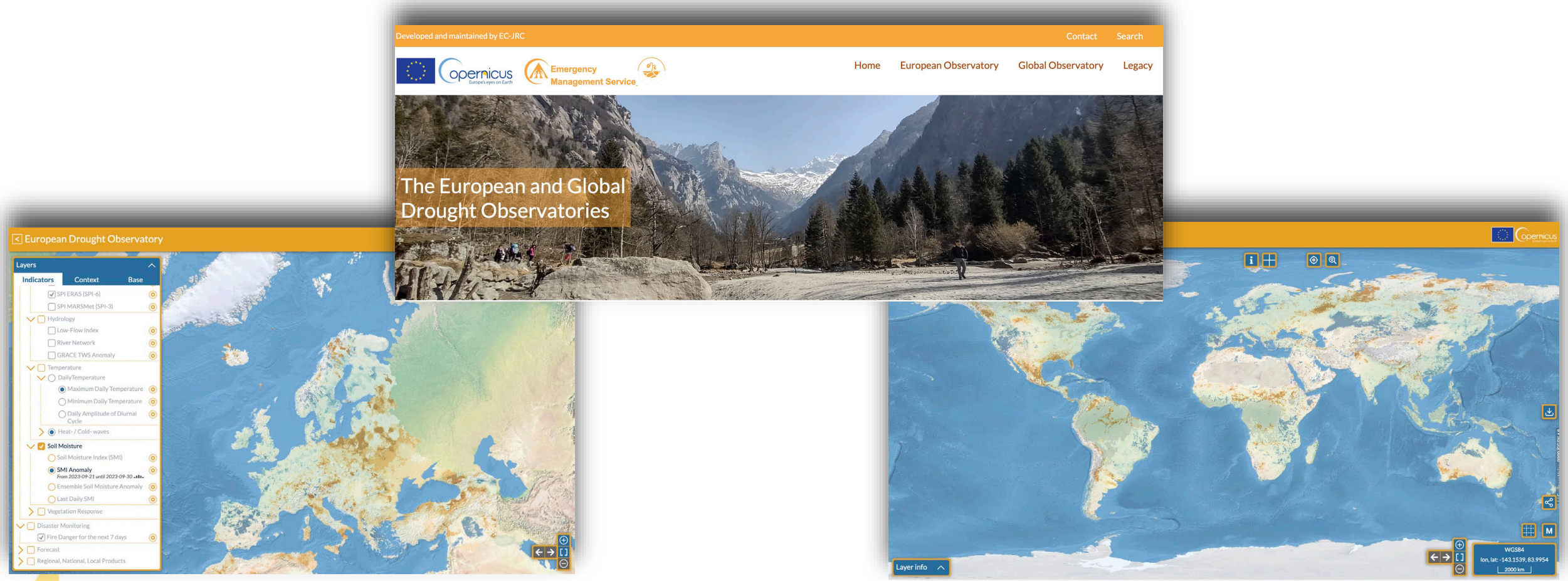
European & Global Drought Observatories



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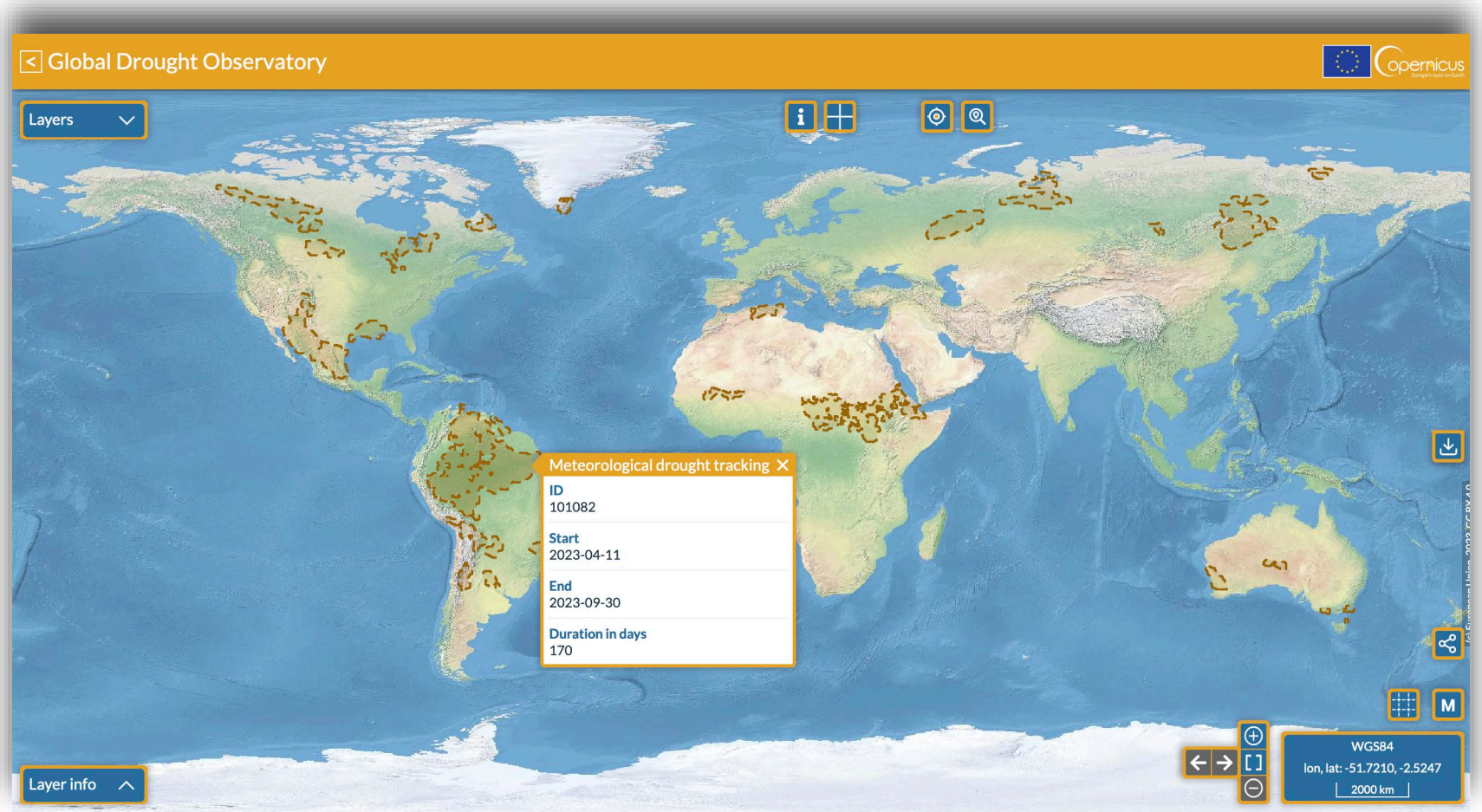
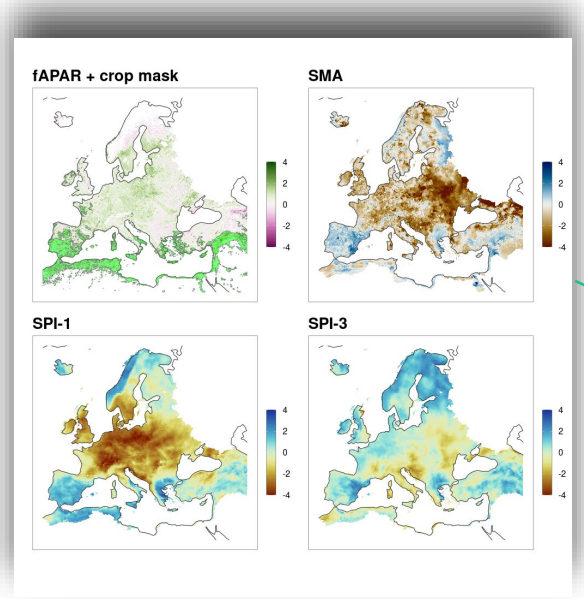
Drought detection and tracking

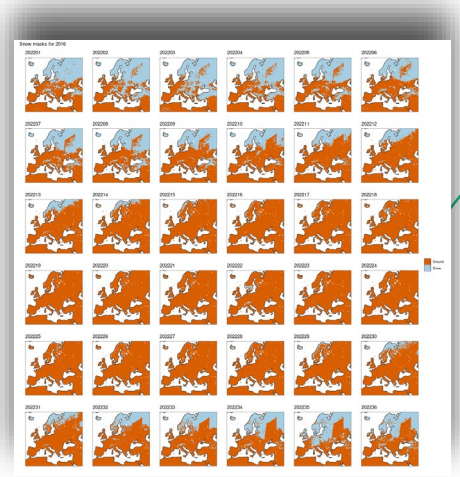


Drought monitoring



2022

CDI V.3

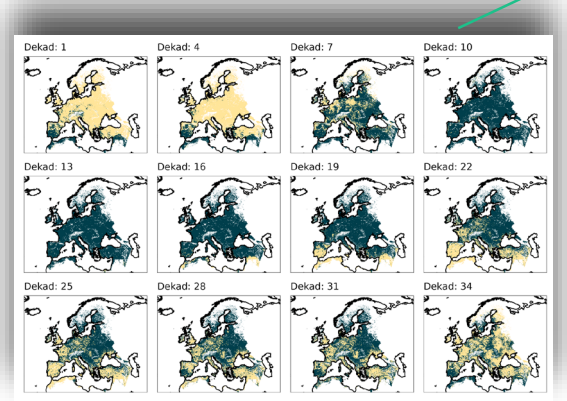


2023/4

CDI V.4

2025

CDI V.5



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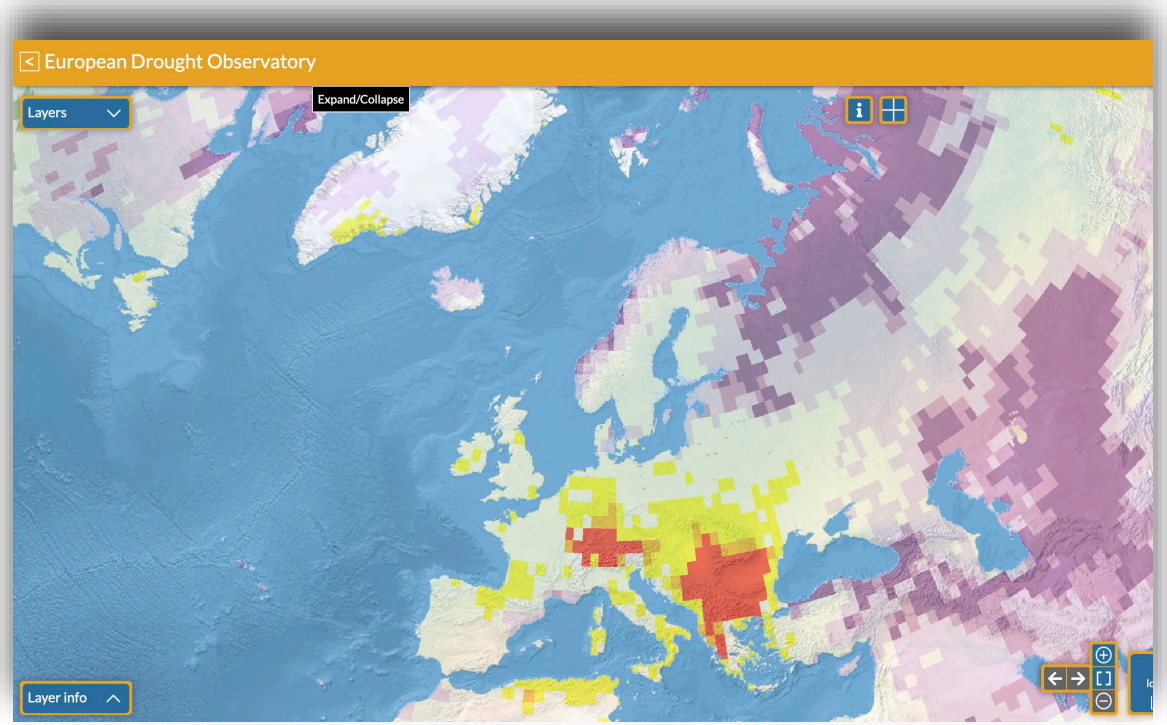
Drought predictions



Wet & Dry conditions for Oct-Dec

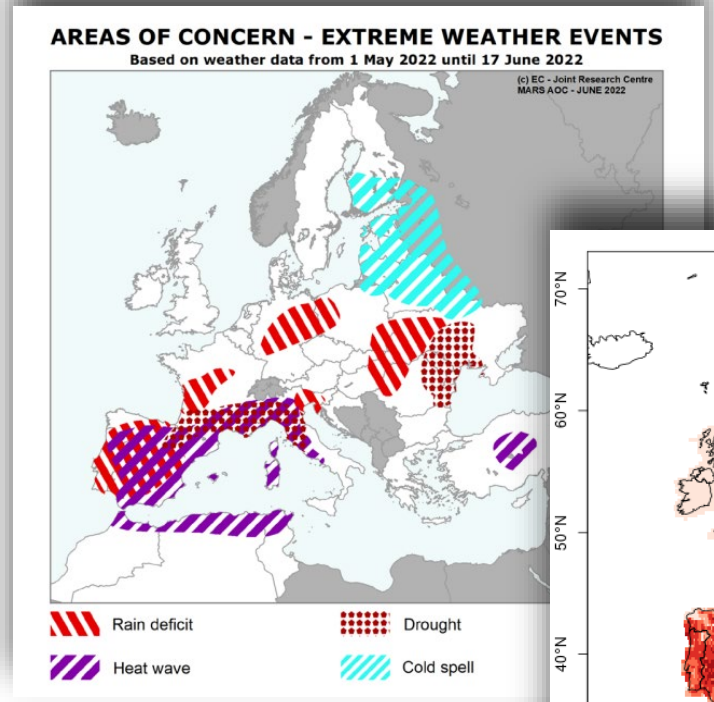
Working on novel approaches based on multi-modelling systems available in C3S

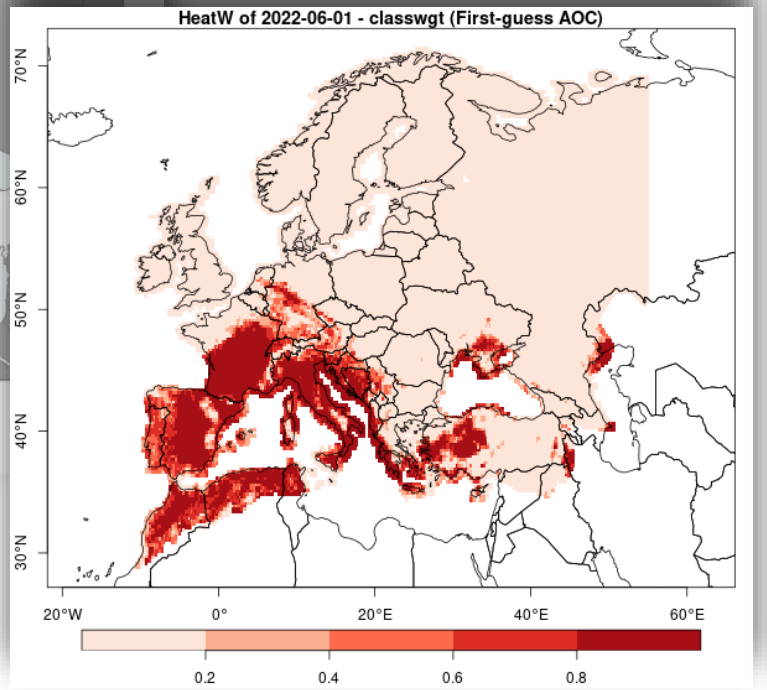
New metrics have been identified

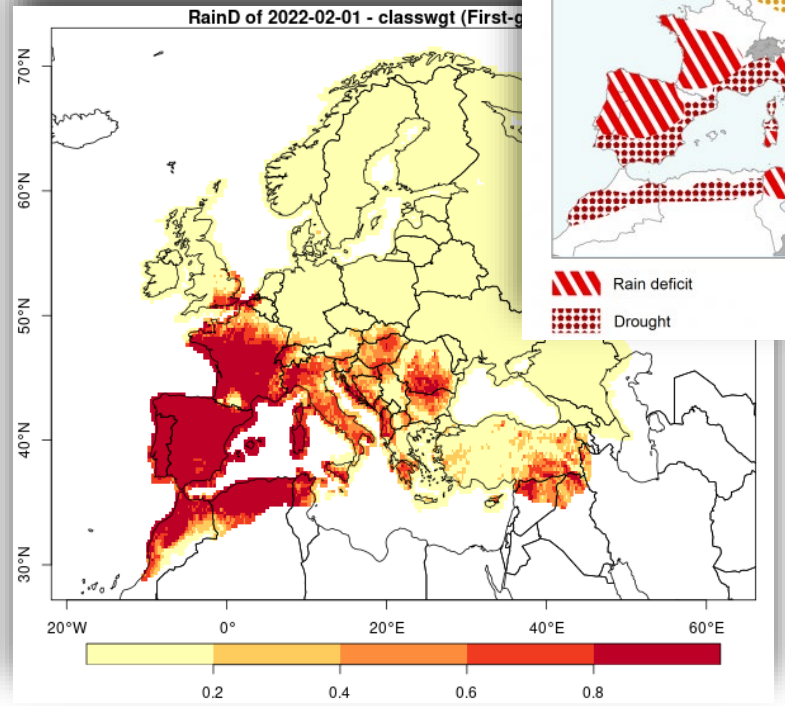
Optimal combination of statistical and dynamics-based approaches

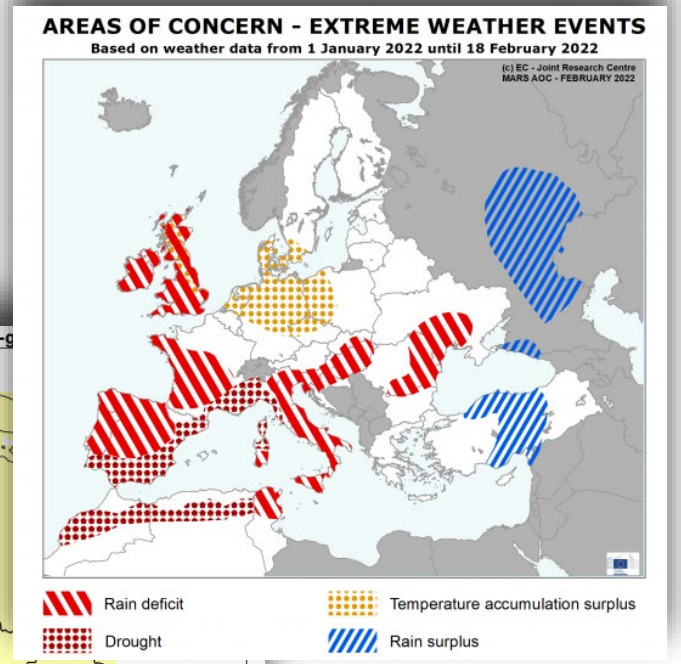
AI-integration

AI-enhanced Climate Services









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AI-enhanced climate services

CLINT
CLIMATE INTELLIGENCE

EXTREME EVENTS
HOTSPOTS
MACHINE LEARNING

ITU
WORLD METEOROLOGICAL ORGANIZATION
UN environment

FG-AI4NDM

Mar 2029
Mar 2024
Mar 2021

ITU Global Initiative

AI:

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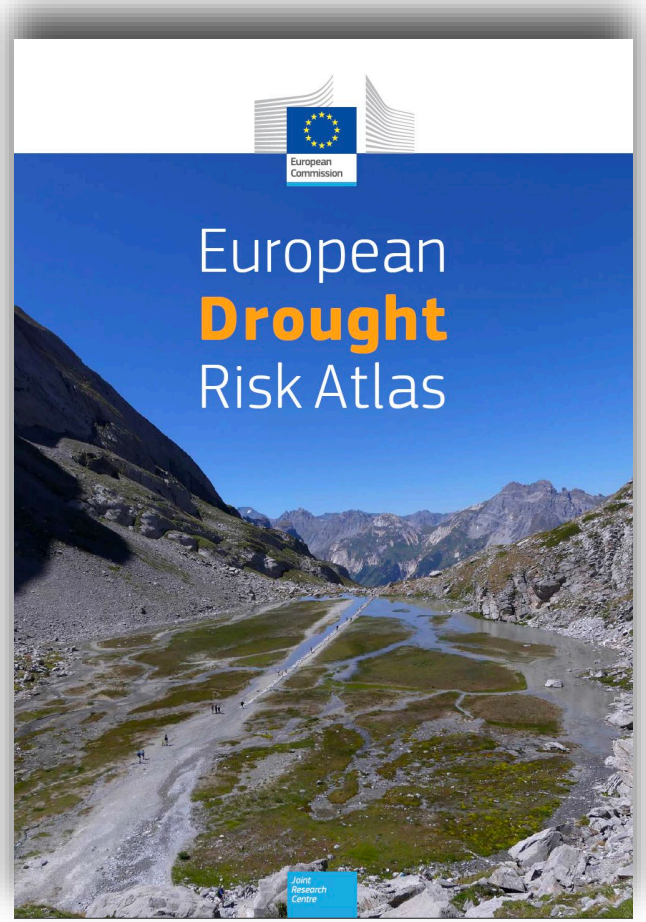
from hazard to risk



Expert -based knowledge & conceptual models

Artificial Intelligence & Statistical methods

Climate projections

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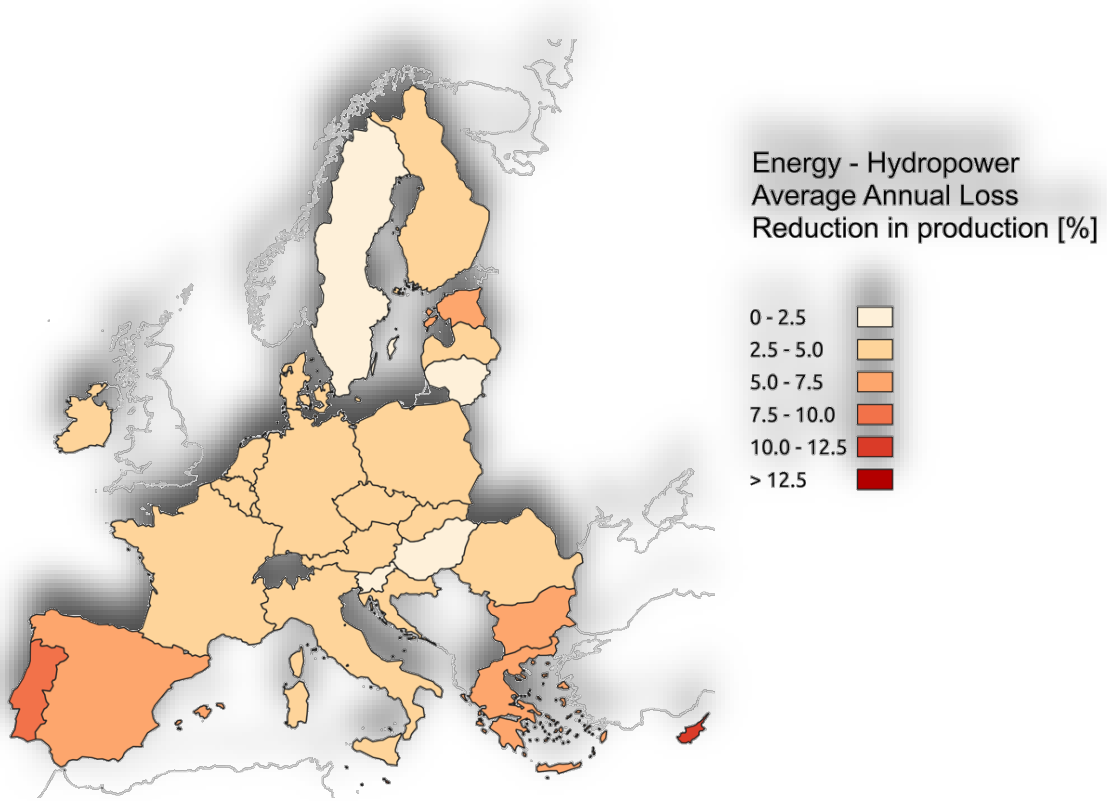
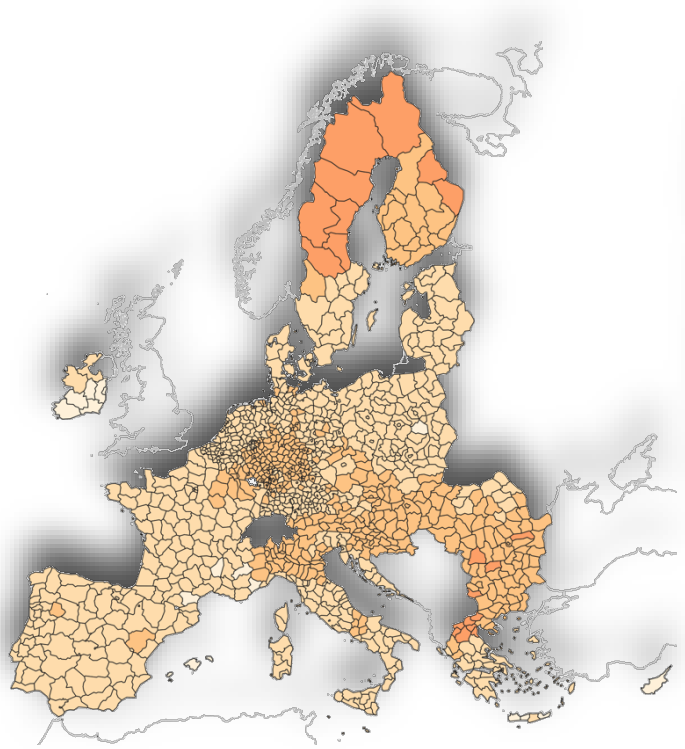
Drought risk: energy & ecosystems



Energy - Hydropower
Average Annual Loss
Reduction in production [%]

0 - 2.5
2.5 - 5.0
5.0 - 7.5
7.5 - 10.0
10.0 - 12.5
> 12.5



Terrestrial ecosystem
Average Annual Loss
Reduction in
Net Primary Production [%]

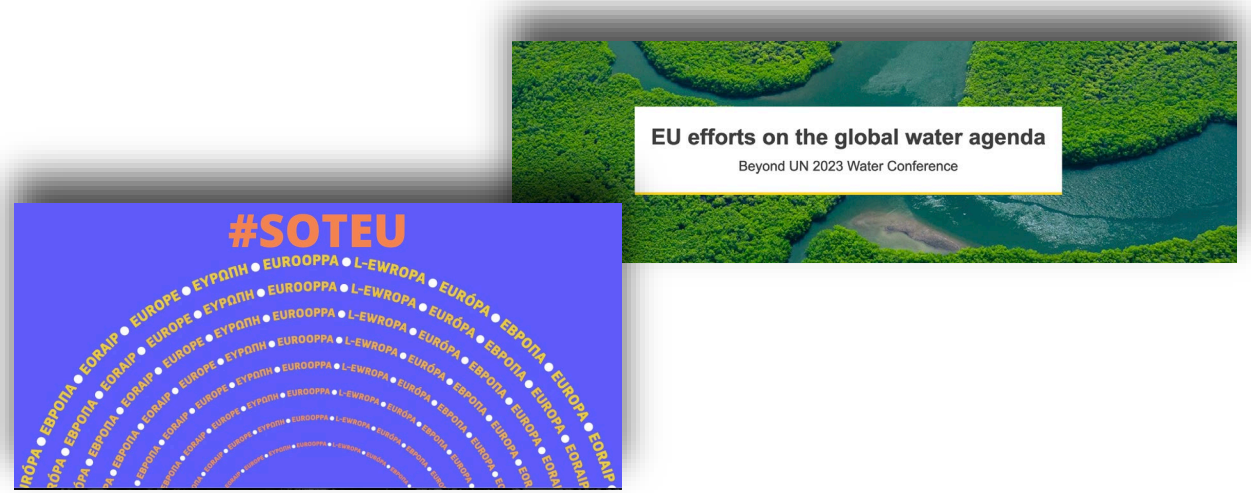
0.00 - 1.00
1.00 - 2.00
2.00 - 3.00
3.00 - 4.00
4.00 - 5.00
5.00 - 6.00
6.00 - 7.00
7.00 - 10.00

Conclusions

- Predicting, detecting and monitoring drought is still challenging
- Multiple data sources to extract the best possible information
- Optimal AI-integration
- New combined approaches for seasonal-to-decadal predictions
- The emergence of complex extremes needs innovative tools
- Efforts on impact data collections

Drought resilience

- Cooperation among sectors & countries is essential
- EWS and climate services are key components of any sustainable adaptation strategy
- UN Water commitments
- Water Resilience Initiative



Keep in touch

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emergency.copernicus.eu

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