




# Empowering Drought Resilience in South-Eastern Europe

Session 1

Challenges of Climate Change Adaptation  
in South-Eastern Europe

4–6 Feb 2025  
Brdo pri Kranju, Slovenia





*Keynote speech*

# Running Dry – How to empower Drought Resilience in South- Eastern Europe?

Andreja Sušnik,  
Slovenian Environment Agency

Challenges of Climate Change Adaptation  
in South-Eastern Europe

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# „Managing the Enigma of Drought: It's Not About our Toolsets, It's About our Mindset!“

Mark Svoboda, director, National Drought Mitigation Center Nebraska,  
keynote speech at the Conference



## Drought Resilience Conference +10

### Conclusions and Recommendations

#### Turning Drought Resilience Challenges Into Action

The Drought Resilience +10 Conference (DR+10), held in Geneva on 30 September – 2 October 2024, brought together numerous participants from all over the world and provided a global forum for the exchange of knowledge, perspectives, and visions amongst the global drought community on how to enhance drought governance and management at all levels and boost actions towards drought resilience.

Under the auspices of the World Meteorological Organization (WMO), the Global Water Partnership (GWP), and the United Nations Convention to Combat Desertification (UNCCD), the Integrated Drought Management Programme (IDMP) coordinated an open, inclusive, and participatory process in which all participants were invited to develop, review and refine the conclusions and recommendations of the Conference.



#### Recommendation no 1.

Drought resilience and global alignment:

Strengthen international collaboration and dialogue on drivers of globally networked risks (e.g. trade and food security impacts from droughts in different parts of the world), on monitoring, and on vertical and horizontal coordination across regions, nations, sectors, and communities.





# ‘Turning Point’ COP16 UNCCD Concluding with Accelerated Action and Ambition to Fight Land Degradation and Drought



UNCCD 16th session of the Conference of the Parties

Foto: UNCCD COP 16, News-room, 2024

The Global Risks Report 2025  
20th Edition  
INSIGHT REPORT



## World Economic Forum:

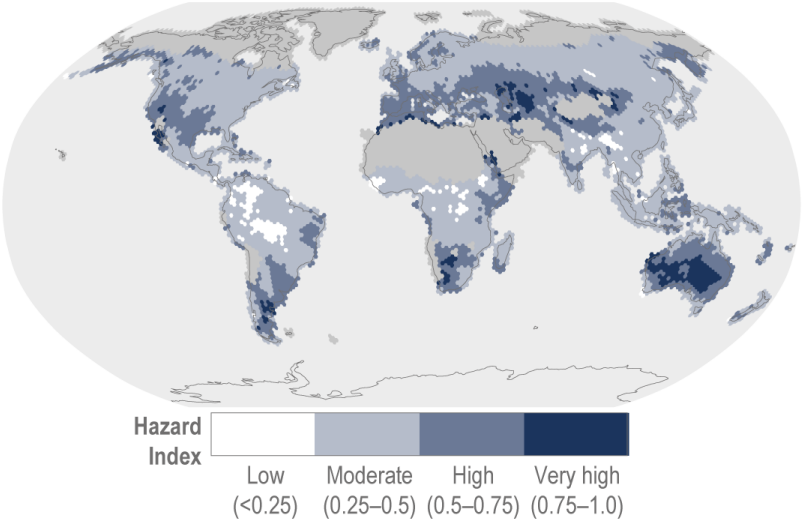
„The outlook for environmental risks over the next decade is alarming.\*“

*\*Global Risks Perception Survey 2024-2025, insights from over 900 experts worldwide.*

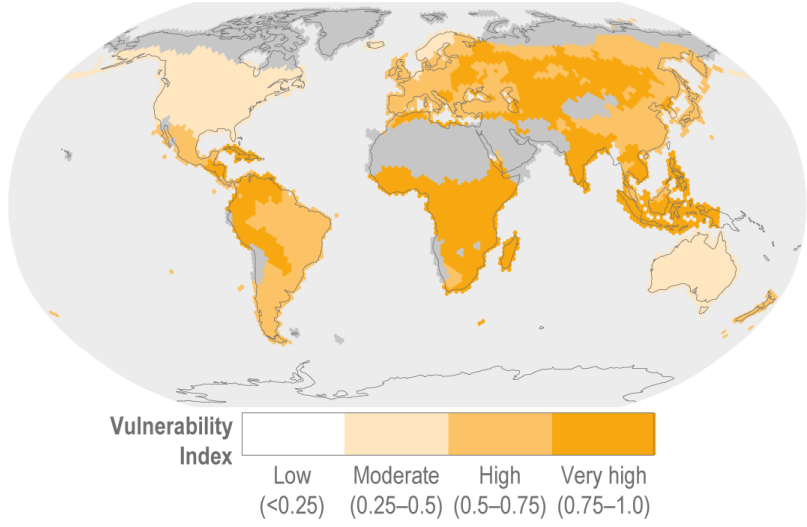


**Current global drought risk**  
averages for period 1901–2010

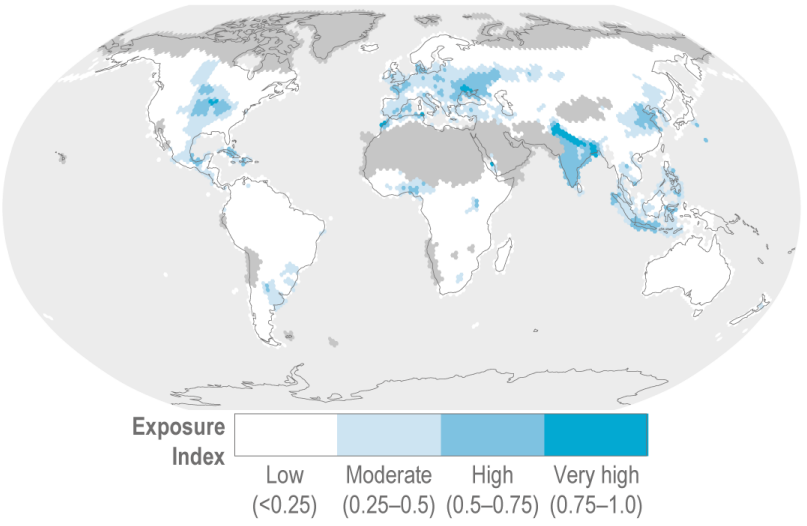
(a) Drought hazard



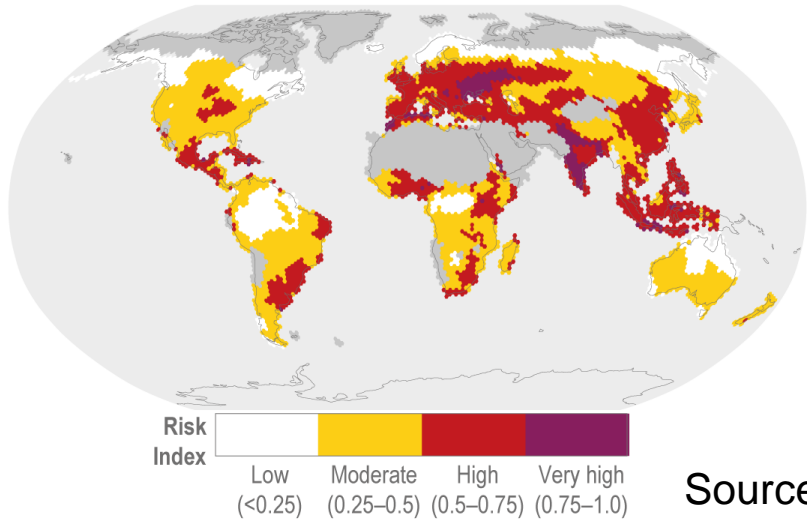
(b) Drought vulnerability



(c) Drought exposure



(d) Drought risk



# Current global drought risk and its components

- An increase in drought-related risks is expected globally due to the combined effects of extreme weather events and population exposure.
- Human influence has increased the frequency and intensity of droughts on global and local scales.
- IPCC considers drought to be the costliest of natural hazards.

Source: IPCC AR6 WG1, Figure 4.9

# Assessment of observed changes in agricultural and ecological drought

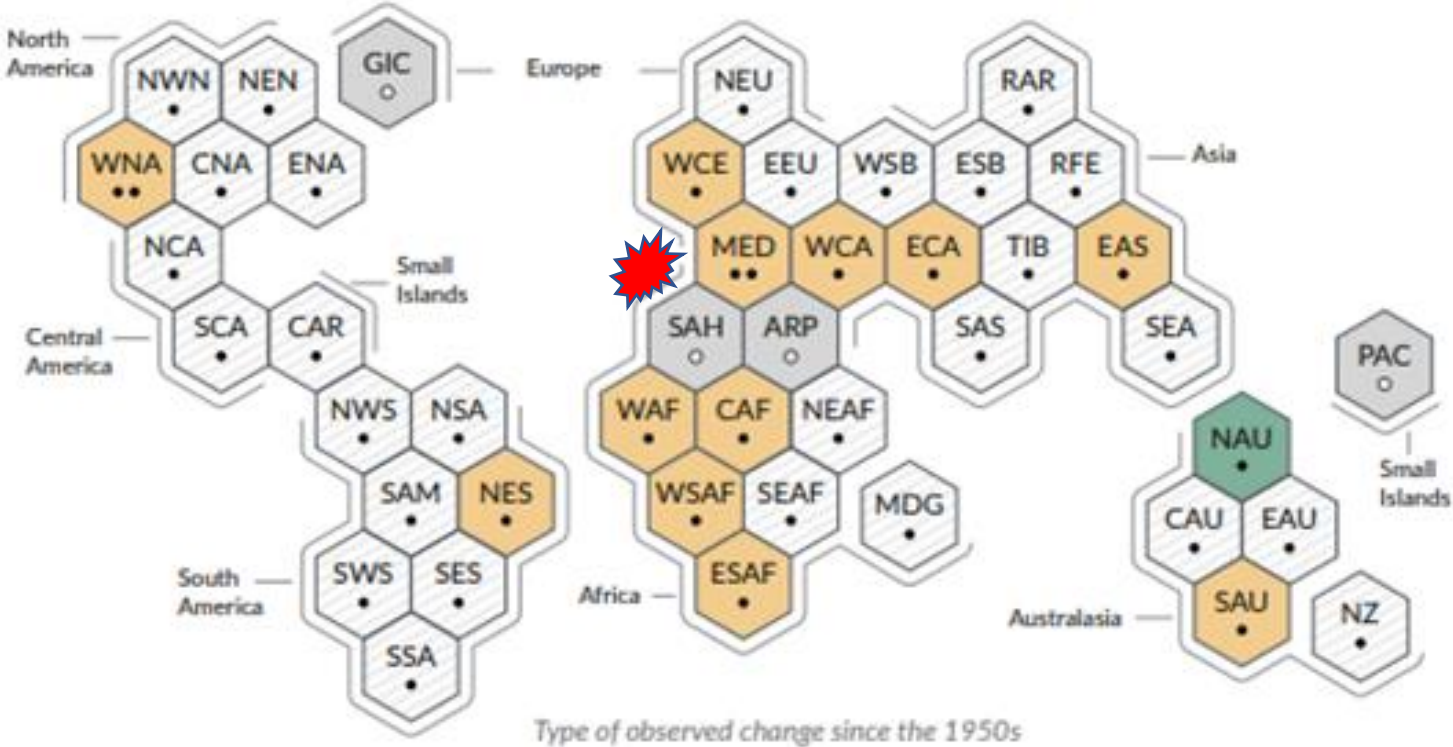
(c) Synthesis of assessment of observed change in **agricultural and ecological drought** and confidence in human contribution to the observed changes in the world's regions

Type of observed change in agricultural and ecological drought

- Increase (12)
- Decrease (1)
- Low agreement in the type of change (28)
- Limited data and/or literature (4)

Confidence in human contribution to the observed change

- High
- Medium
- Low due to limited agreement
- Low due to limited evidence



Type of observed change since the 1950s

Yellow hexagons indicate regions where there is at least medium confidence in an observed increase in this type of drought.

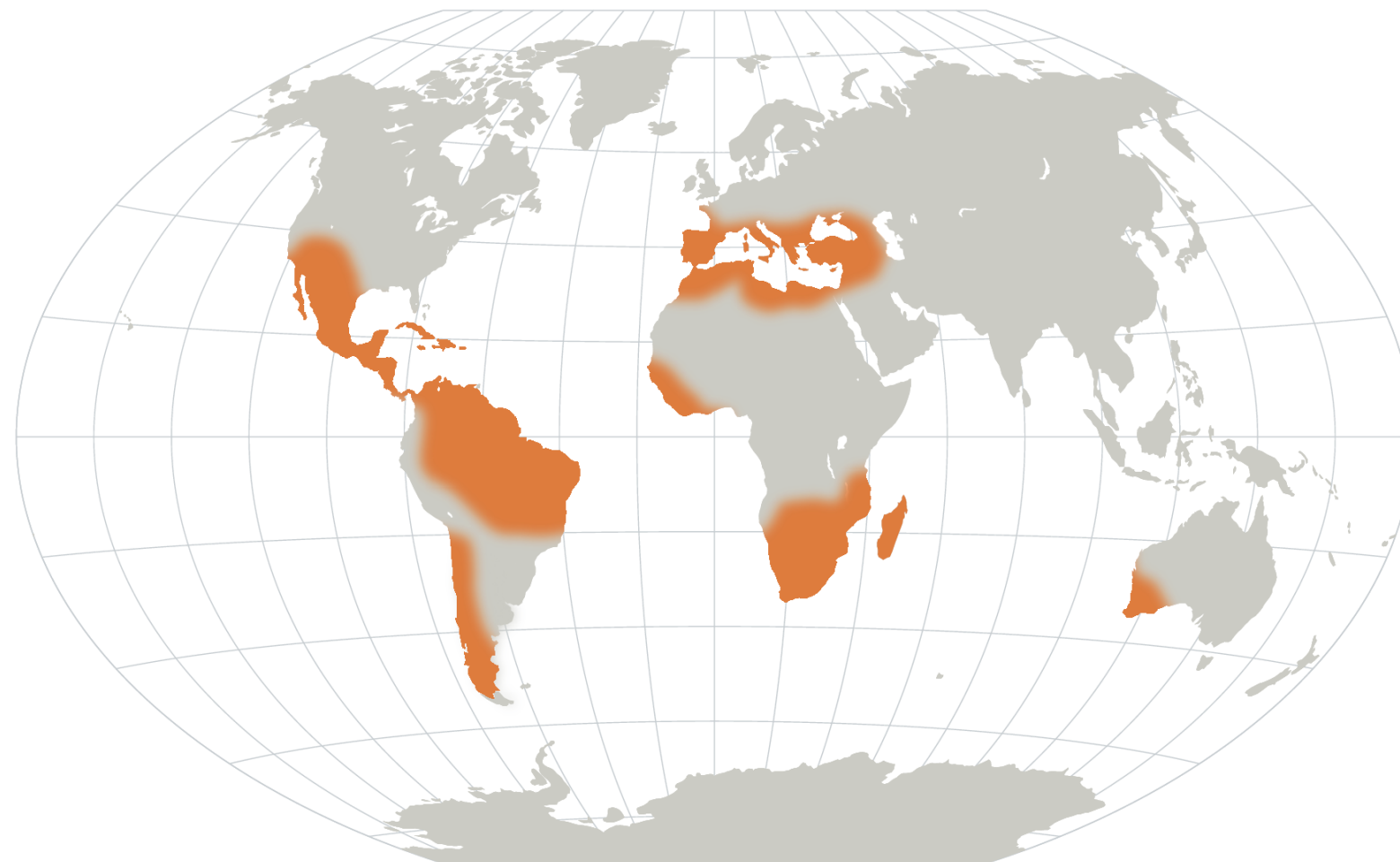


## IPCC Sixth Assessment Report

Working Group 1: The Physical Science Basis

### FAQ 8.3: Climate change and droughts

In some regions, **drought** is expected to increase under future warming.



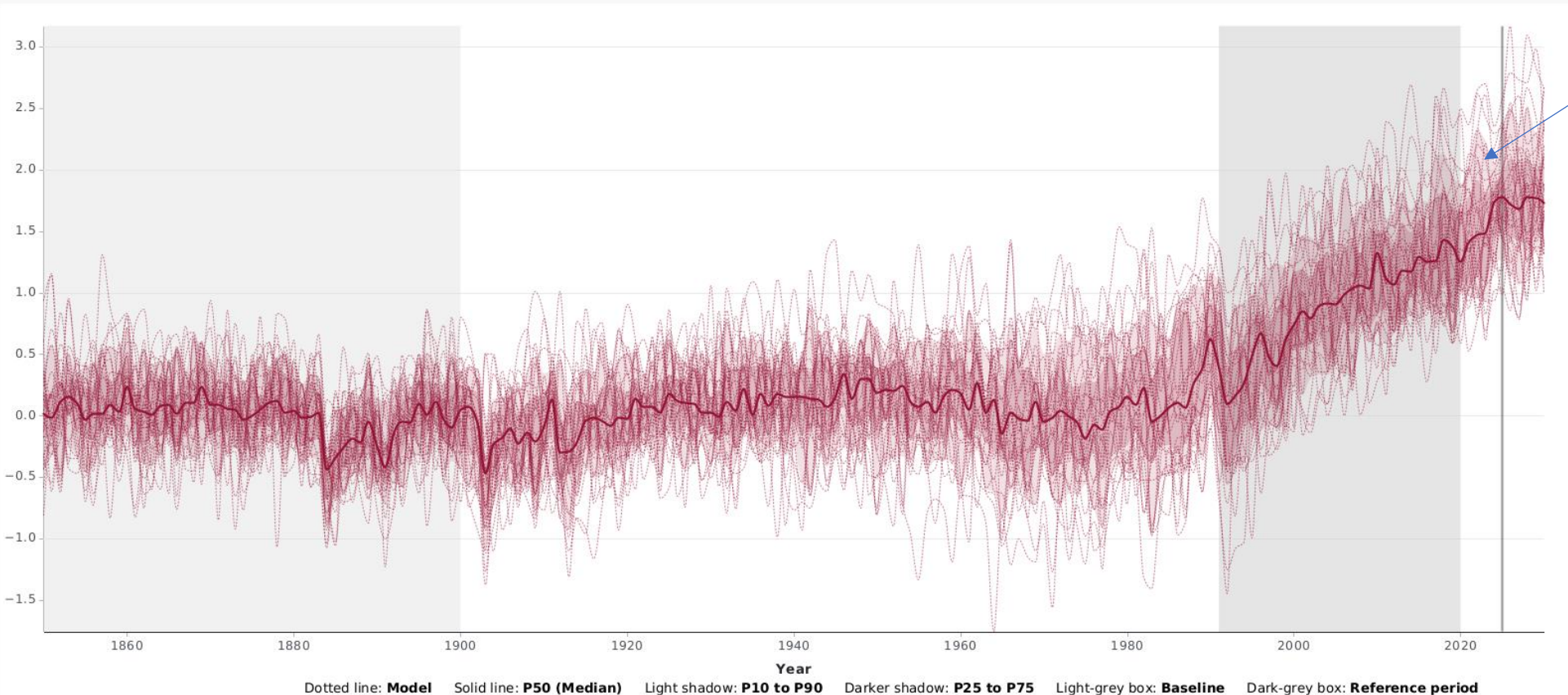
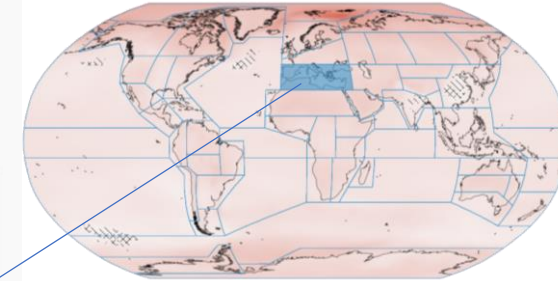
If emissions of greenhouse gases are not curtailed, about a third of global land areas are projected to suffer from at least moderate drought by 2100.

(FAQ 8.3 Figure 1 in IPCC, 2021: Chapter 8. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*)

# Warming trend in Mediterranean

MEAN TEMPERATURE (°C) - CMIP6 - CHANGE - REL. TO 1850-1900  
- HISTORICAL - 1991-2020 - ANNUAL FOR MEDITERRANEAN

Credit: C3S/ECMWF



Dotted line: **Model** Solid line: **P50 (Median)** Light shadow: **P10 to P90** Darker shadow: **P25 to P75** Light-grey box: **Baseline** Dark-grey box: **Reference period**



PROGRAMME OF THE EUROPEAN UNION



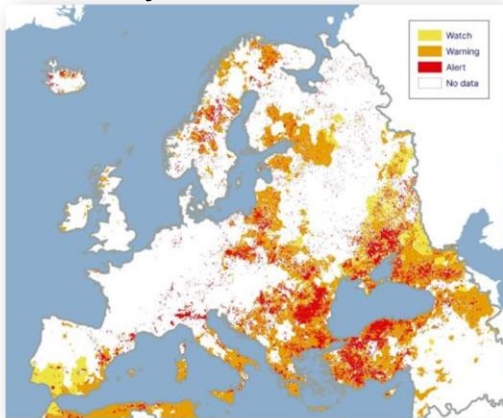
Source:  
<https://atlas.climate.copernicus.eu/atlas>



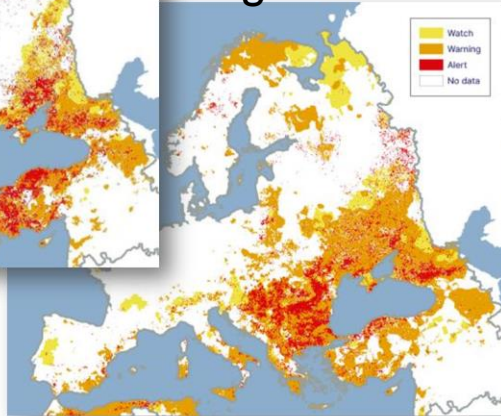
# The drought problem is worsening in Europe

**Danube River Basin droughts between 2016-2023**  
 (Source: DMCSEE Drought Bulletins, EDO Drought Reports, ICPDR Questionnaire / Map: WWF)

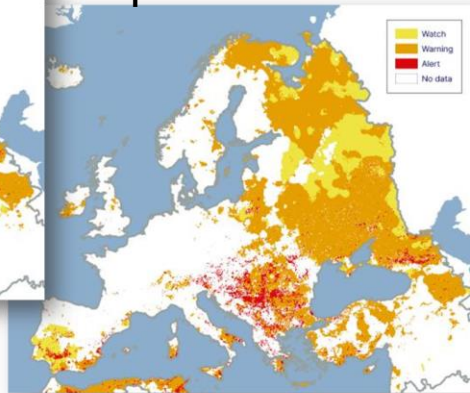
July 2024



August 2024



September 2024



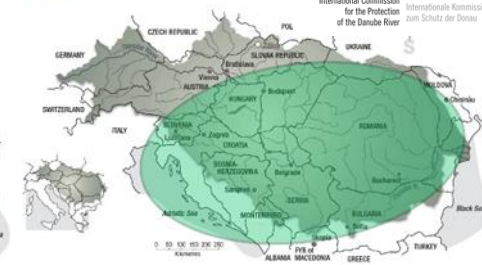
Drought development from July to September 2024 in Europe (CDI indicator) (Source: EDO/JRC)

2003, 2007, 2012, 2013, 2015..

2016



2017



2018



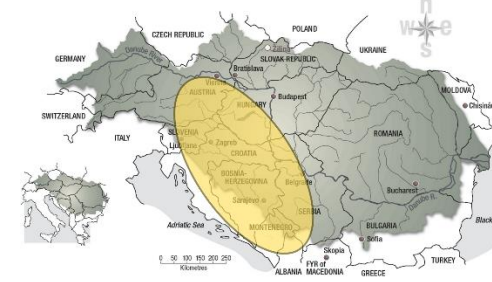
2019



2020



2021



2022



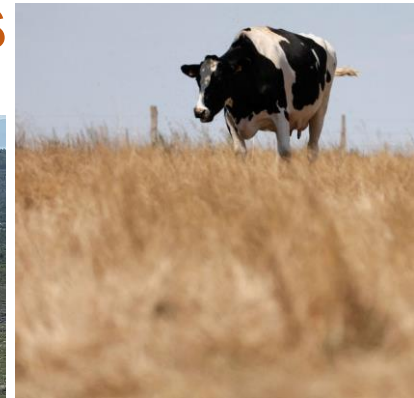
2023





# Symptoms of of droughts in recent years

## Velika suša uništava poljoprivredu regiona



09 Aug 2012 | Ažurirano: 04 May 2017 03:56 PM (GMT+2)

## Suša v slovenski Istri: vojna v času miru

V Rižanskem vodovodu so ponosni, da še vedno zagotavljajo pitno vodo. Ribiči svarijo, da Rižana ne sme presahnniti.



Brez namakanja v kmetijstvu ne gre. A če ni vode za namakanje, se vse posuši. FOTO: Črt Pikiš



## Suša ustavila plovbo po Donavi, ujetega na tisoče ton blaga

Vir: Suzana Pehlo in Pia Bedene  
30. avgusta 2022, 08:52

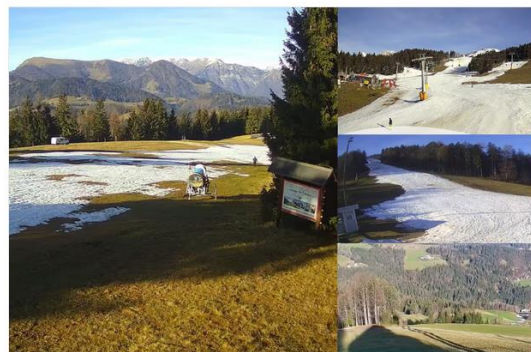
- V Bolgariji ostalo 'ujetega' več kot 1,2 milijona tona premoga in 20 tisoč ton nafte
- Ostalo je tudi 600 tisoč ton svinarje, ki se uporabljajo za proizvodnjo umetnih gnojil
- Bolgarska vlada bo srbikom graubnim strojem omogočila opravljanje del na kritičnih točkah



Bloomberg


## Smučarji se sonca ne veselijo več: slovenska smučišča prisiljena k zapiranju prog

6. 1. 2023, 12:08 | Vir: STA | A. B.



- Heat waves & summer droughts – rapid droughts
- Dry springs and autumns
- Drop of river discharges all over Europe (Po, Rhine, Danube, Alpine streams etc.) and lakes
- In Alpine space „green winters or snow drought“
- Multiyear drought
- Compound and cascading extreme events



Annual crops 

Aquatic ecosystems 

Public water supply 

Hydropower 

# Increasing trend in negative impacts of drought

on various fields of life and economy:

- agriculture, irrigation
- livestock, ecosystems
- water supply, tourism
- hydropower
- navigation
- ...



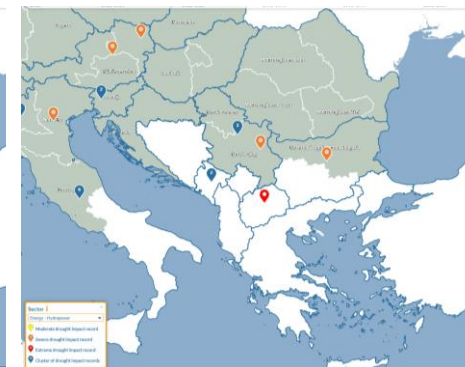
1970-79



1990-94



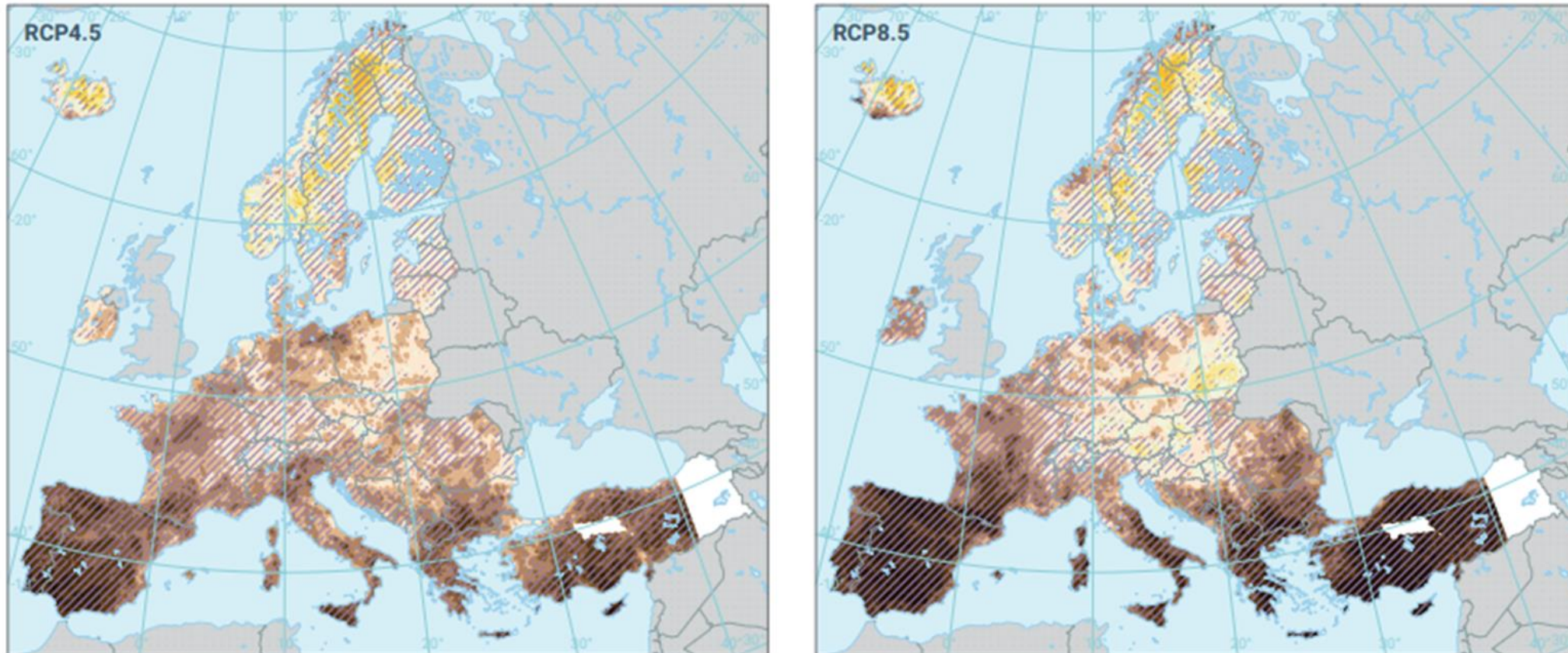
2020-23



Reported number of neg. impacts of drought on various sectors from moderate to severe levels. Source: European Drought Impact Database, 2025.



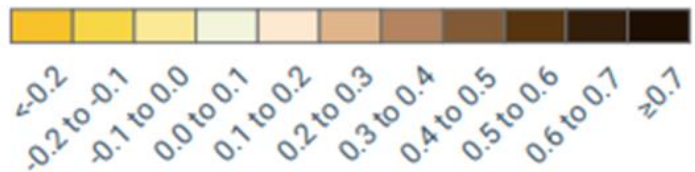
# Projected higher drought frequency in Europe






Reference data: © EuroGeographics, © FAO (UN), © TurkStat Source: European Commission – Eurostat/GISCO

Projected change in meteorological drought frequency between the periods 1981-2010 and 2041-2070 under two climate change scenarios

Number of events per 10 years

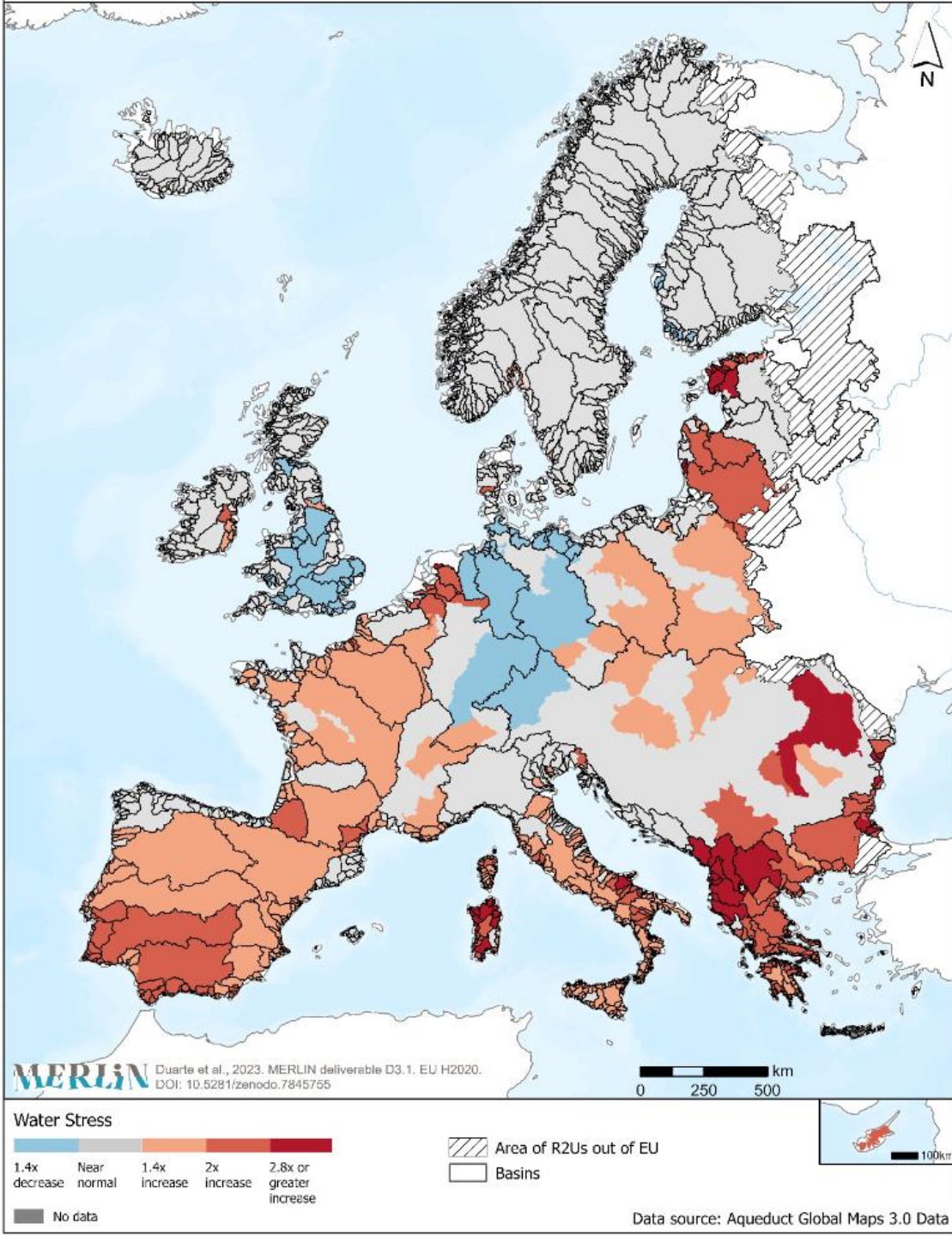


-  At least two thirds of the simulations used agree on the sign of change
-  No data
-  Outside coverage

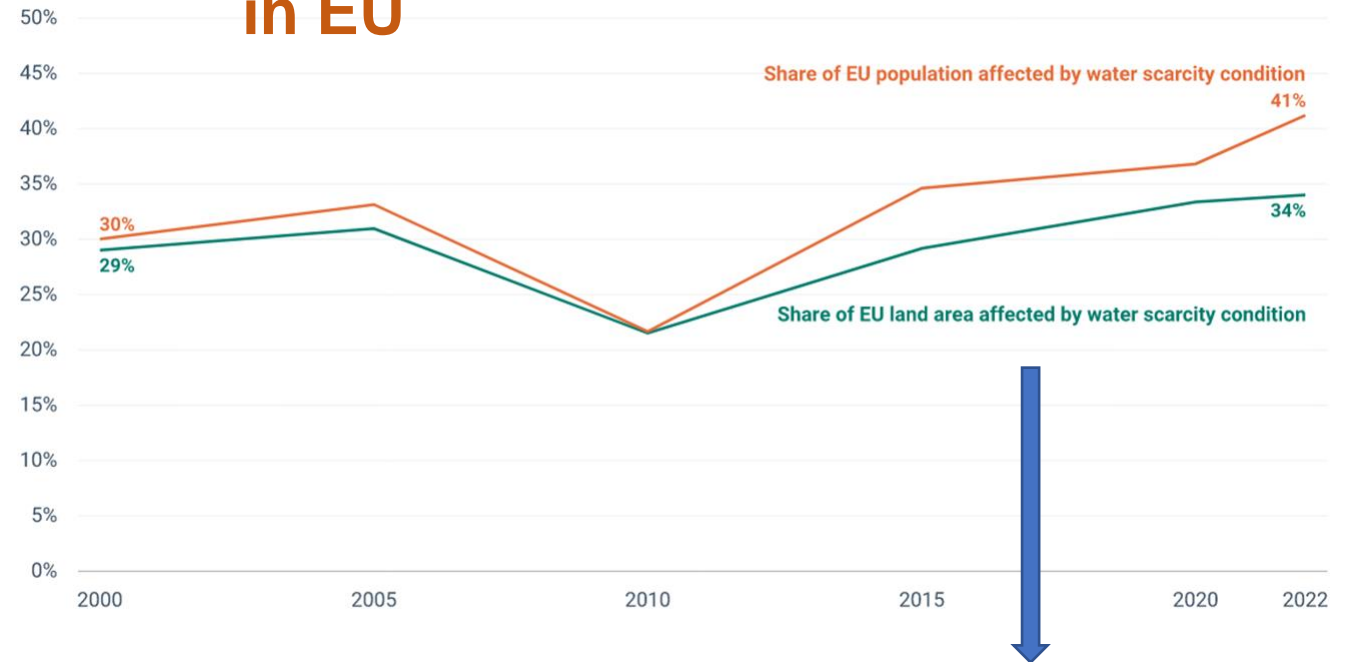
Source: EEA, 2024







# Increase in water scarcity and projected change in water stress in EU



Projected **change in water stress** from baseline 1951-2010 to **2040** under a business-as-usual scenario, for each river restoration unit.

Source: Merlin project, 2023.



**Panel 2**

**Monitoring and forecast:**



Untimely delivery (when drought already in place), diverse indicators, forecast, tools, data sources ..



Lacking integration of drought risk and impact data

**Panel 3**

**Drought impacts and risk assessment:**



Weak or missing regular and systematic collection of drought impacts



Drought is still not considered an issue of high priority despite the impacts on the economy and the welfare of the living environment

**Panel 4**

**Management:**



No formal legislation on proactive drought management



Weak or missing cooperation between key actors



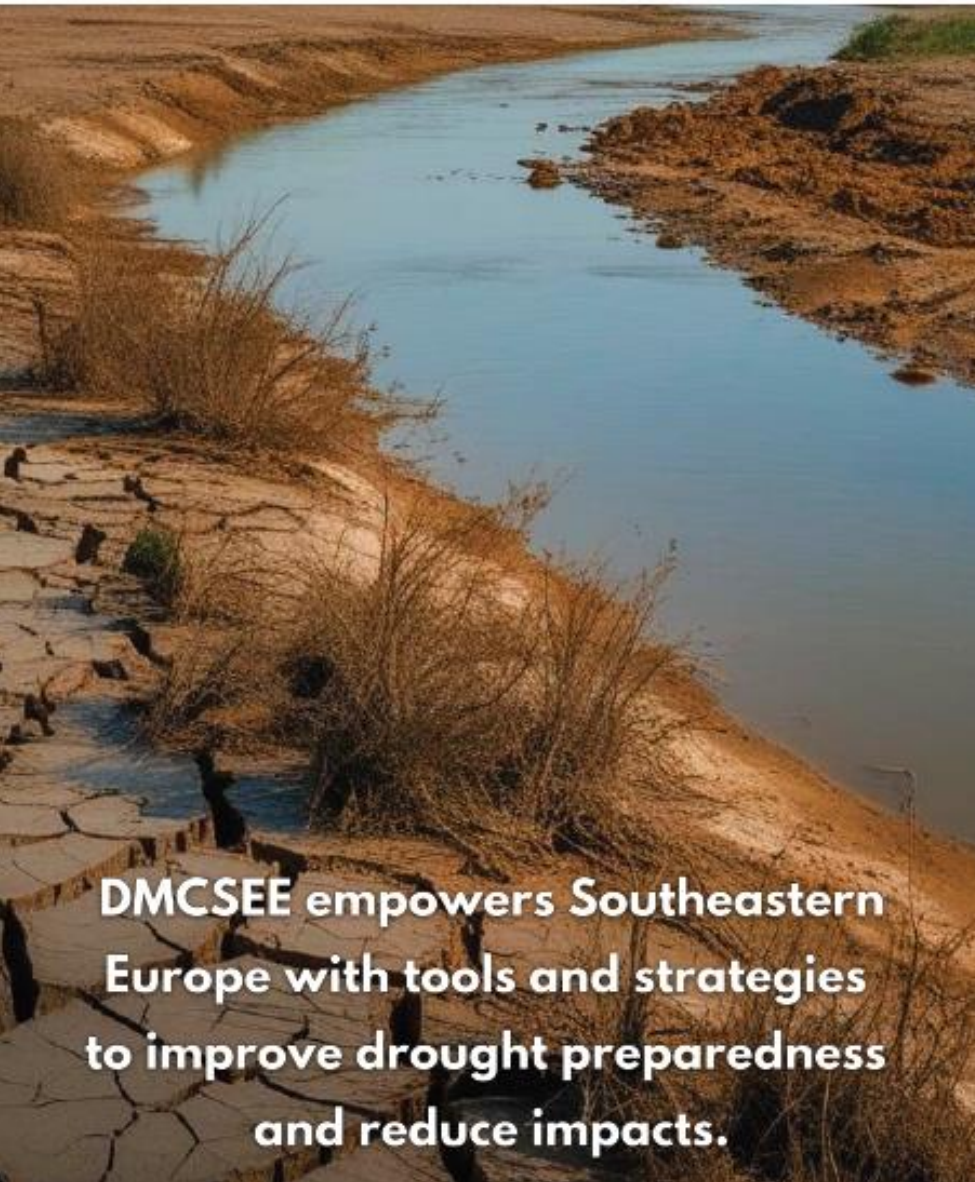
Reactive, dealing mainly with losses and damages

# Increasing drought challenges in SE Europe

Drought is becoming one of the major challenges in water management in SEE







**DMCSEE empowers Southeastern Europe with tools and strategies to improve drought preparedness and reduce impacts.**

# The story of DMCSEE



**Drought teams centred in NMHS of 13 countries in SE Europe**



**[www.dmcsee.org](http://www.dmcsee.org)**



**Established in 2006**



**Founding agencies: UNCCD, WMO**



**Hosted and coordinated by ARSO**



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# DMCSEE community – drought teams in NMHSs



Institute of GeoScience  
ALBANIA



Federal Hydrometeorological Institute  
BOSNIA AND HERZEGOVINA



Republic Hydrometeorological Institute  
BOSNIA AND HERZEGOVINA - REPUBLIKA SRPSKA



National Institute of Meteorology and Hydrology  
BULGARIA



National Meteorological and Hydrological Service  
CROATIA



Hellenic National Meteorological Service  
GREECE



Hungarian Meteorological Service  
HUNGARY



State Hydrometeorological Service  
MOLDOVA



Institute of Hydrometeorology and Seismology  
MONTENEGRO



Hydrometeorological Service  
NORTH MACEDONIA



National Meteorological Administration  
ROMANIA



Republic Hydrometeorological Service  
SERBIA



Slovenian Environment Agency  
SLOVENIA



Turkish State Meteorological Service  
TURKEY



# Road to DMCSEE establishment

1998-2004

Centre initiative  
idea `brewing`

Decision on  
DMCSEE host  
institution  
(led by WMO)

2006



2007

Slovenian government  
commitment

- permanent budget for DMCSEE governance

DMCSEE project  
(TCP South East Europe)

- First joint project
- Setting up operational regional drought monitoring

2009-2012

2013-2025

Project work – 3 pillars of  
drought management

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# IDMP: Three pillars of successful drought management

<https://www.droughtmanagement.info/pillars/>



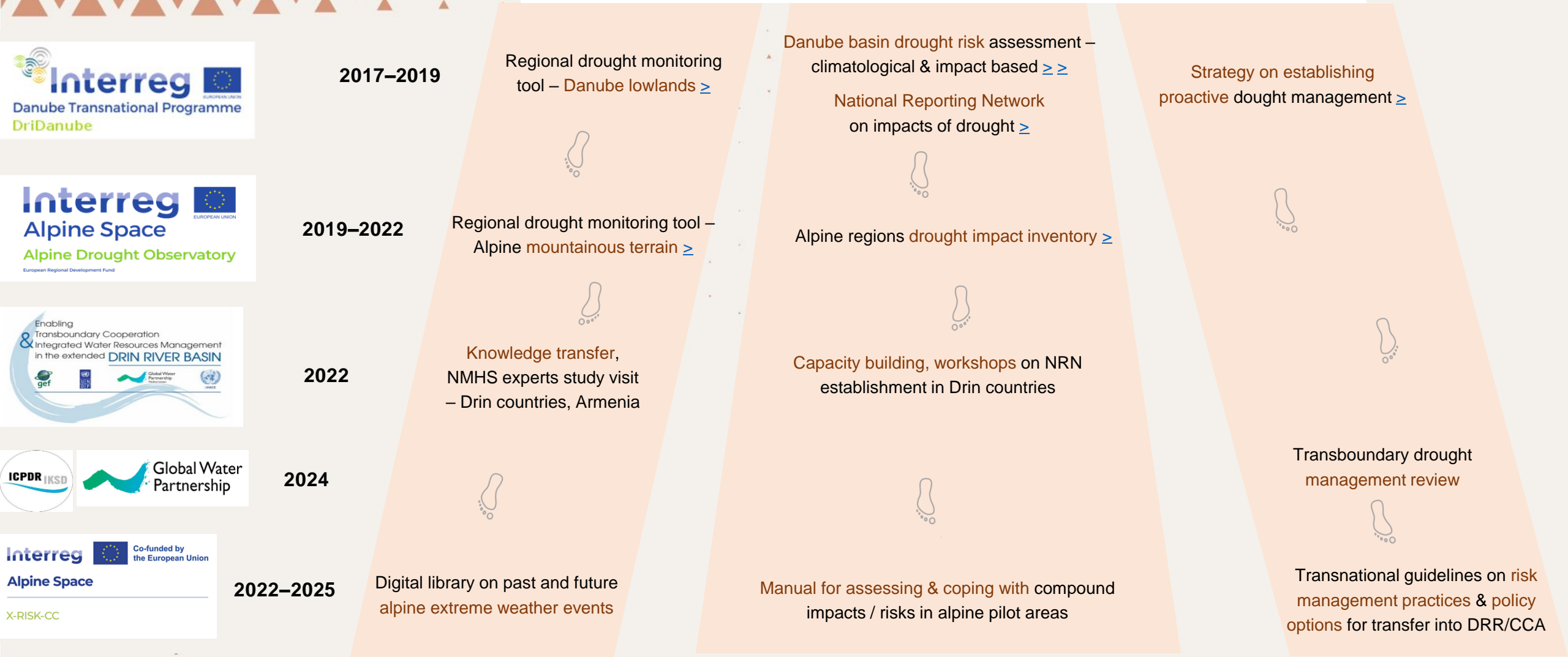
Monitoring Early Warning



Risk & Impact Assessment



Risk Mitigation, Preparedness & Response







2023–2026



Monitoring Early Warning



Risk & Impact Assessment



Risk Mitigation, Preparedness & Response

Regional monitoring & forecasting tool - drought, heatwave, forest fire central and SE Europe



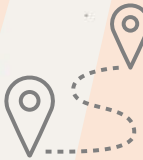
HOW?

- Multi-indicator platforms
- Drought risk & impact indicators
- Sharing different approaches

Newspaper-based DHF events and impacts database 2000-2023



HOW?



- Regular & systematic impact collection
- Establishing national impact database
- Robust drought risk assessment

National response plans: drought, heatwave, forest fire



HOW?

- Preparedness management practices
- Sector-tailored, yet one community
- Kick-start actions

HOW?



Collaboration & Preparedness mindset

# Panellists



**Birgit Vogl**

*International Commission for the  
Protection of the Danube River*



**Daniel Tsegai**

*United Nations Convention  
to Combat Desertification*



**Valentin Aich**

*World Meteorological  
Organization / Global Water  
Partnership*



**Blaž Kurnik**

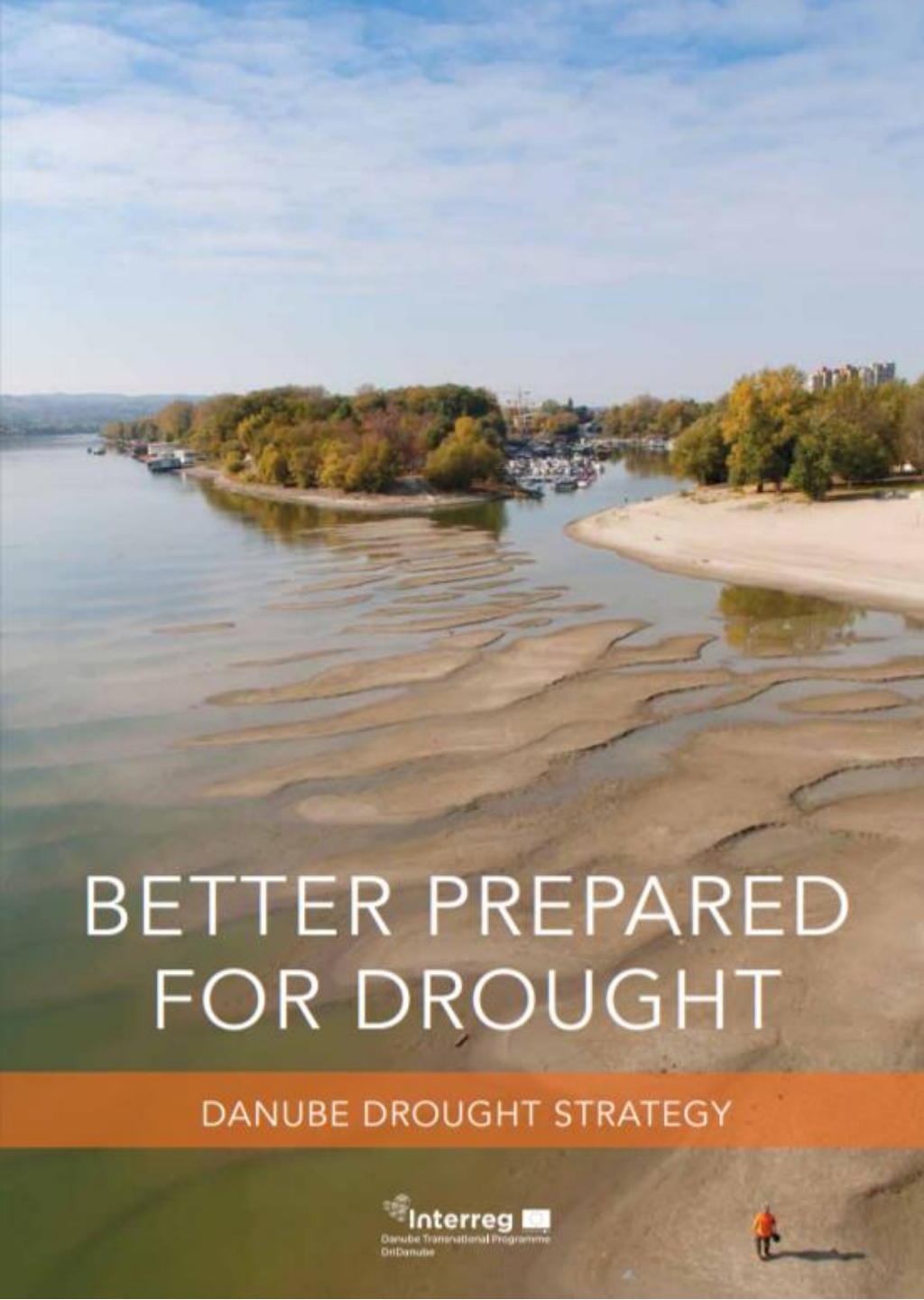
*European Environment  
Agency*



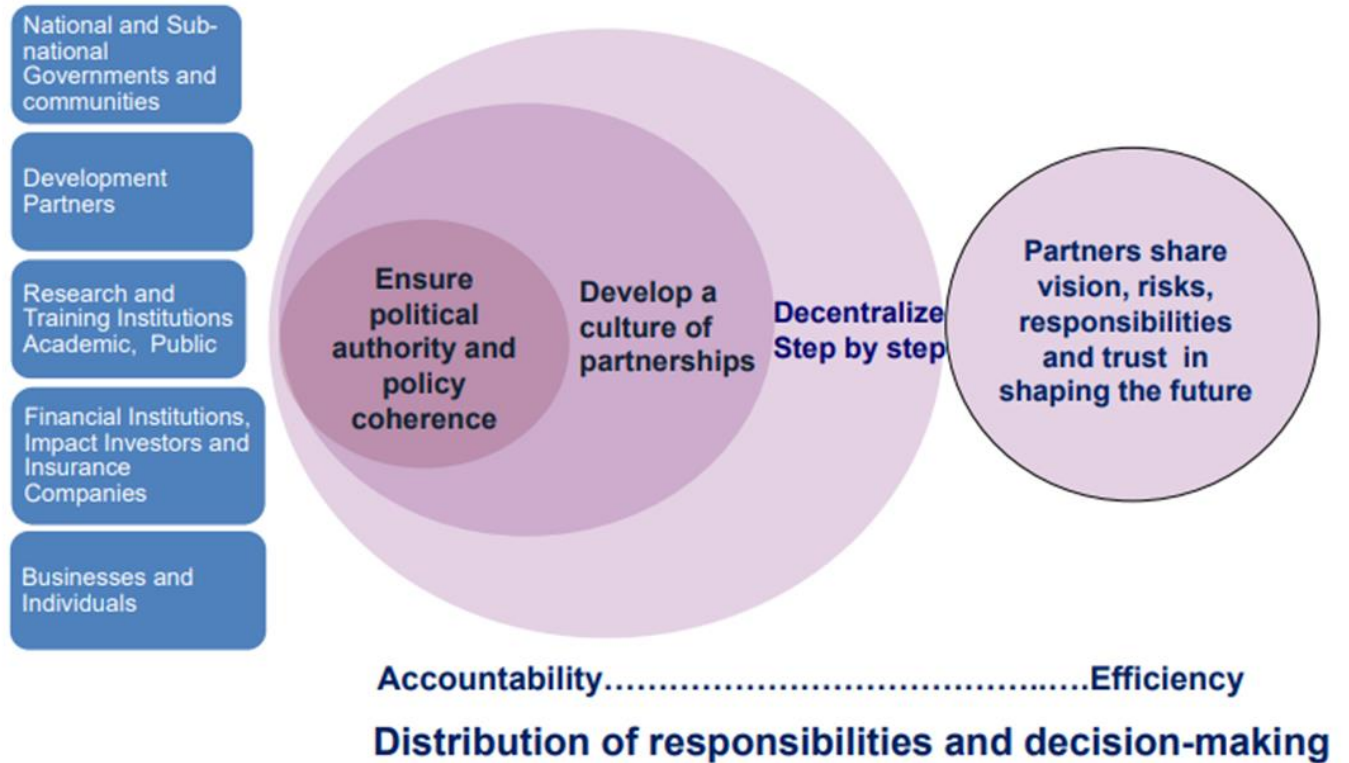
**Klemen Bergant**

*European Network of National  
Meteorological Services*





# Panel 1: How can countries in South-Eastern Europe work together to strengthen drought resilience?



Graphics courtesy: Pulwarty, 2024