



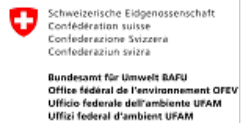
Global Workshop
on Droughts in Transboundary Basins
 26-27 February 2024, Geneva



Droughts and Water Scarcity in the Danube River Basin: Coordinated Activities Towards Water Resilience



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Danube River Basin and ICPDR

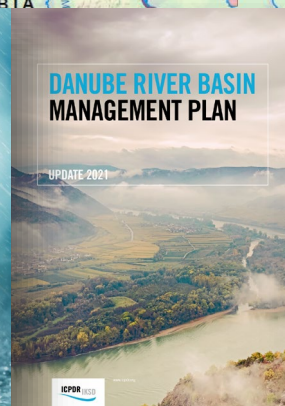
Danube River Basin District Overview

DRBMP Update 2021 - MAP 1



- Danube River Protection Convention signed in 1994
- ICPDR established in 1998 to implement the Convention
- Coordination of the implementation of EU WFD & FD

800.000 km²
 10% of Continental Europe
 6.500 m³/s mean discharge
 79 million people
 19 countries



Organic Pollution



Nutrient Pollution



Effects of Climate Change (drought, water scarcity, etc)



Hazardous Substances Pollution



Hydromorphological Alterations

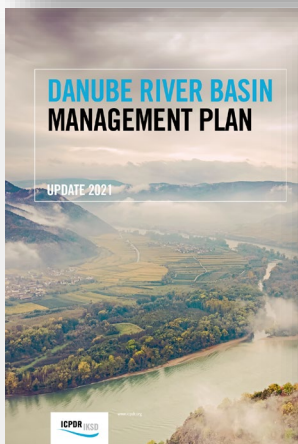
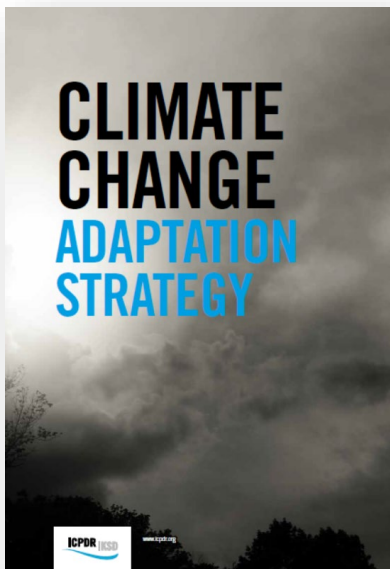
Basin-Wide Response to Climate Change

Tackling climate change adaptation with a **basin-wide strategy**:

- Guiding how to **integrate adaptation** into overall ICPDR planning
- Relevant actions incorporated in the **DRBMP and DFRMP**
- Supporting transboundary actions and feeding into **national strategies**
- Toolbox of potential **adaptation measures**

Effects of Climate Change reflected in the last management plan:

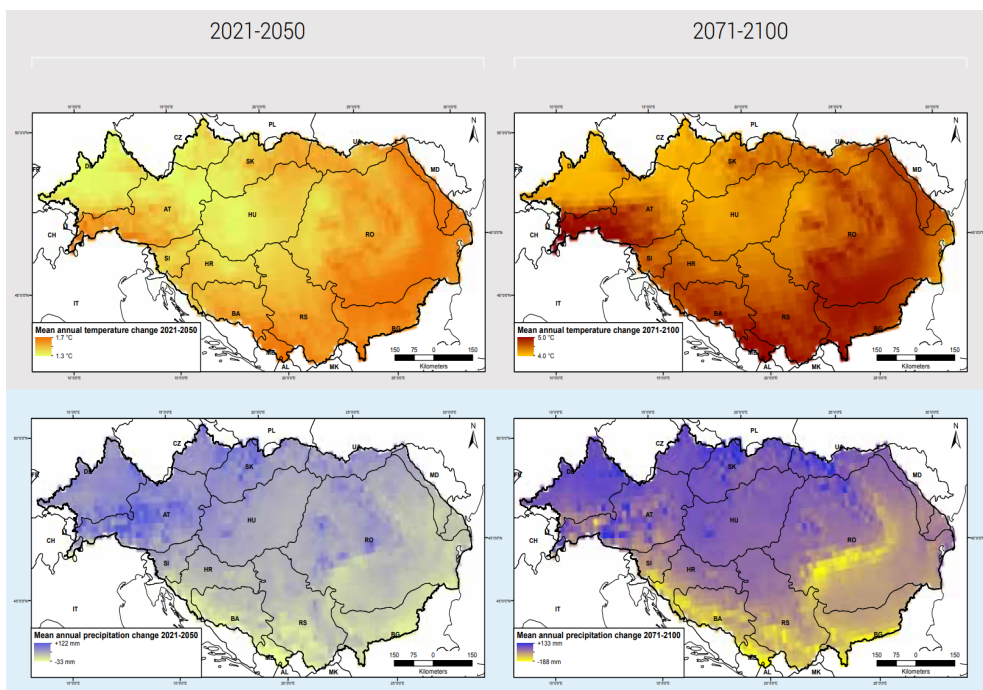
- Declared as a **Significant Water Management Issue**
- Assess possible/additional **negative impacts** (pressures)
- Consider **affected water uses** in the DRB
- Identify possible **adaptation measures/actions**



Effects of Climate Change (drought, water scarcity, extreme hydrological phenomena and other impacts)

Climate Change Scenarios for the DRB

Changes of **annual mean temperature** and **precipitation** according to the RCP 8.5 of the EURO-CORDEX (as of 2018)



- Seasonal changes in precipitation
- Increased intensity of extremes

Extreme impacts on water resources (JRC, 2018):

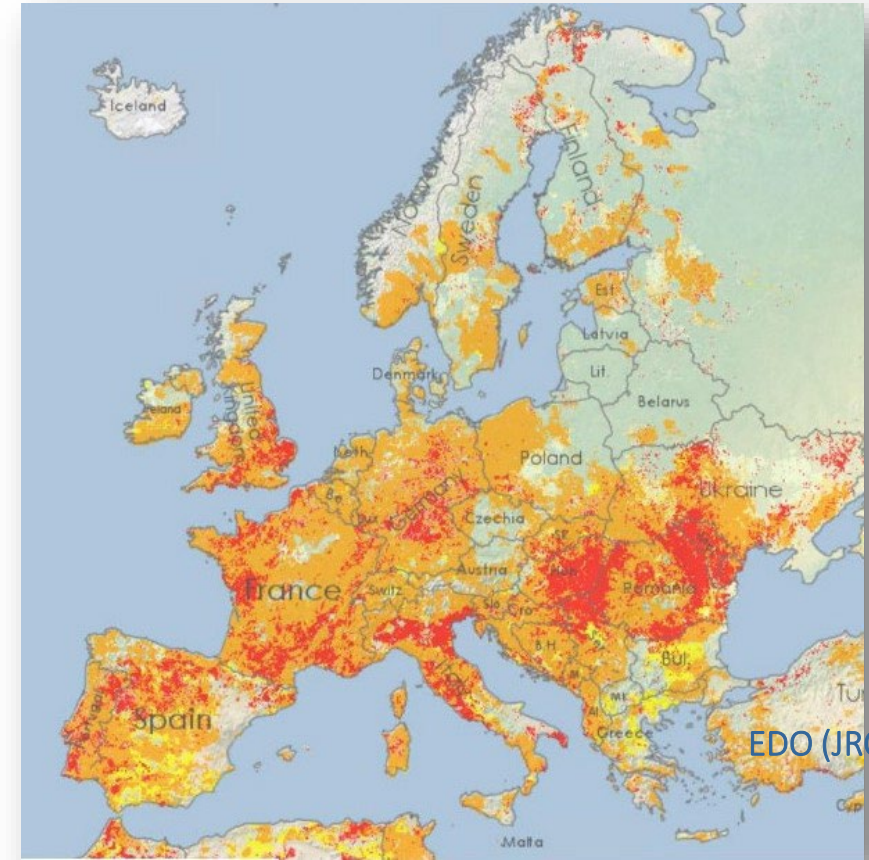
- Increased **peak river flows** by 10-30% for the upper and middle Danube
- Increased **duration, frequency and magnitude** of droughts during summer months
- Heavily increased **water scarcity** in Bulgaria, Serbia, Romania, Hungary, Slovakia and Moldova
- **Agriculture and energy sector** with lack of water and loss of production



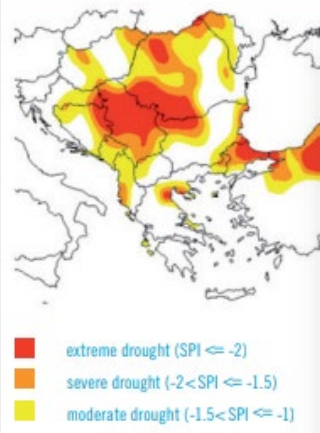
Recent Droughts in the Danube Basin



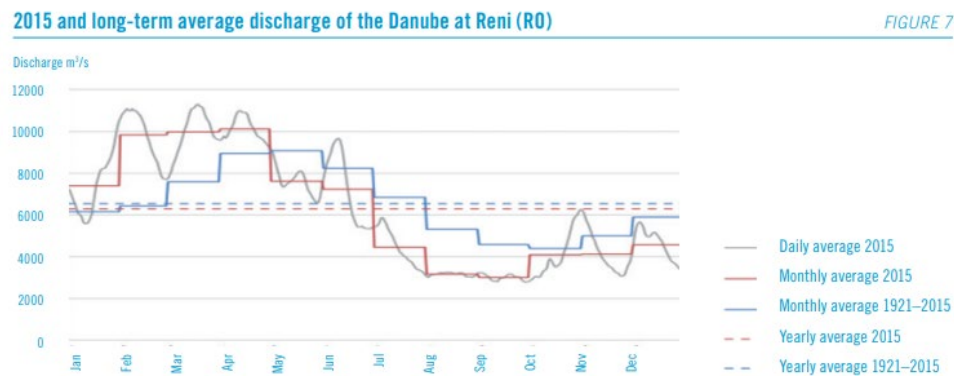
Combined Drought Indicator for August 2022



Standardized Precipitation Index (SPI)*
SPI Jul 2015 (1 month), GPCP first-guess analysis *FIGURE 2b*



2015 Drought and Danube Discharge



Watch	Warning	Alert	Full recovery	Temporary soil moisture recovery	Temporary fAPAR recovery moisture recovery	No data
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Drought Impacts

Drought consequences:

- Impacts on aquatic and terrestrial **ecosystems**
- Impacts on **water uses**, e.g.
 - Lack of precipitation - reduced summer **crop yield**
 - Low water levels - impacts on **navigation**
 - Reduced stored water volume - impacts on **hydropower**
- Potential **water scarcity** and resource overexploitation

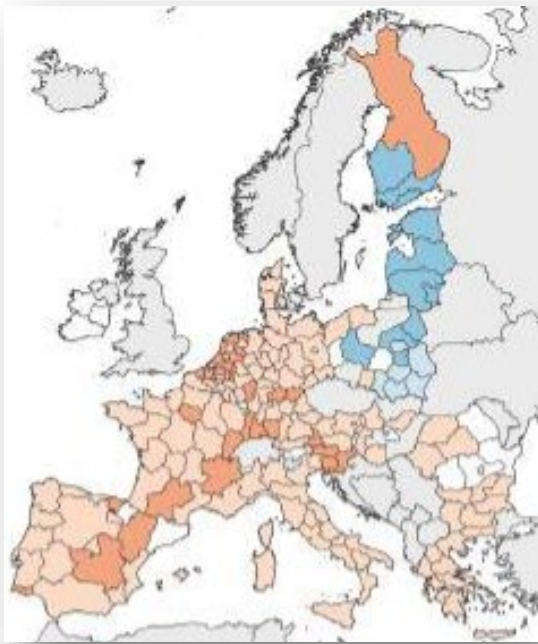


Damage and losses caused by drought 2017	
Austria	140 mio EUR/crop failure and fish mortality.
Bosnia and Herzegovina	126 mio/agriculture, 40 % losses in energy production (Bileća).
Croatia	125 mio EUR/agriculture, >4000 fires over 86 500 ha of the Adriatic coast; islands water supply shortages.
Czech Republic	120 mio EUR/agriculture.
Hungary	51 000 ha of agricultural land damaged.
Montenegro	50 % lower yield in viticulture, 42-50 % losses in energy production (Perućica, Piva), fish mortality.
Romania	reduction of Danube flow for 60 %, higher electricity prices, crop transportation problems.
Serbia	Substantial losses in agriculture, water shortage, dried-up lakes, disturbed energy production. >1 bn EUR/all sectors.
Slovakia	20-40 % lower crop yields, dried-up rivers, hydrological drought.
Slovenia	65 mio EUR/agriculture

Drought Risk in the Danube River Basin

+2 °C global warming / expected changes

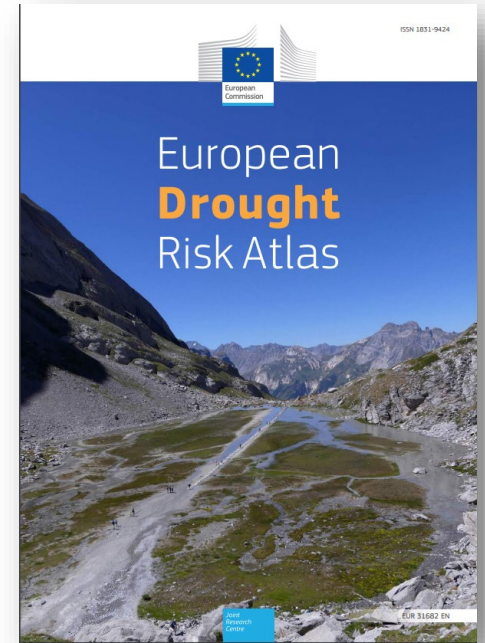
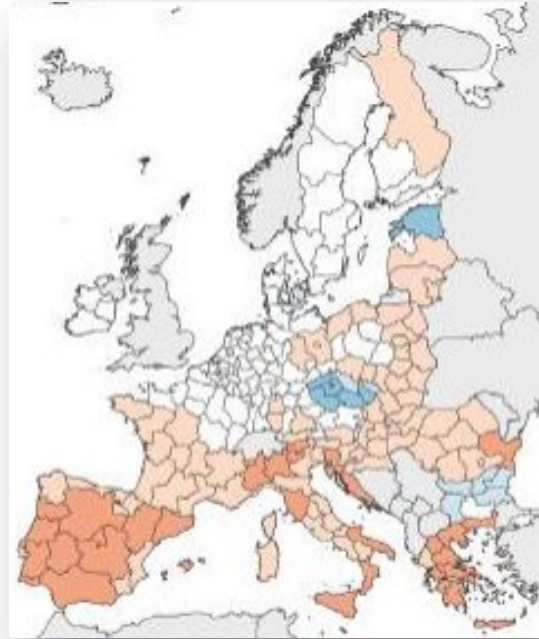
Wheat Yield











Hydropower Generation



Drinking Water Abstraction



Projected Loss / Current Loss

- | | |
|--|--|
|  reduction of more than 25% |  increased by a factor of 1.5 to 2 |
|  reduction between 10% and 25% |  increased by a factor of 2 to 3 |
|  no important variation |  increased by a factor of 3 to 4 |
|  increased by a factor of 1.1 to 1.5 |  increased by a factor of more than 4 |

Expected losses in Danube Basin in relation to current situation:

Wheat yield: 5 – 10%
Hydropower: up to 5 %
Water supply: up to 7,5 %

The Challenge of Managing Droughts in the Danube Basin

Drought monitoring & impacts

- Regionally diverse drought monitoring
- No agreed thresholds for agricultural drought and other
- No systematic and regular collection of drought impacts
- Early warning started at a late stage

Drought preparedness & response

- Lack of cooperation between institutions and across sectors
- No clear inter-institutional responsibility and communication
- Crisis-oriented drought policies
- No formal umbrella document on drought management

Reviewed drought management aspects		National		
		Unit: number of countries out of 10		
Strategic elements in nat. legislation	Drought recognized and/or declared as natural hazard	9	-	1
	National drought management strategy or similar umbrella document on drought exists at governmental level	2	1	7
	National drought management plans prepared, or in preparation	1	1	8
Monitoring and early warning	Drought monitoring in place of public bodies with drought indices	7	3	-
	Defined thresholds for different drought types	1	4	5
	Regular, periodic and on-time informing of public about the level of severity of drought in place (early warning system)	4	4	2
Communication on drought	Information about drought spreads spontaneously through media	10	-	-
	Communication with stakeholders about drought risk, mitigation and damages	-	6	4
	Communication within different level governmental bodies on drought risk, mitigation and damages	1	1	8
Drought response	Systematic adoption of actions to prevent further drought damages	-	2	8
	Regular drought impact collection and/or sectoral damage evaluation in place at public bodies	3	5	2
	Established national drought damage compensation scheme	6	3	1

DriDanube

	Not in place
	In place but not systematic
	In place and systematic

Current/Possible Future ICPDR Activities on Droughts

- **Internal ICPDR Workshop** on drought in the DRB:
 - Understand and identify DRB **transboundary** needs
 - Determine the **role of ICPDR** to put forward basin-wide actions
- **Sate-of-the-art DRB Drought Overview Report** being developed:
 - **Inventory** of policies, plans, approaches, tools, databases and measures
 - Recommended **basin-wide activities** based on a stepwise approach
 - Tackle the way towards ***Water Resilience***
- Potential **follow-up activities** for the near future:
 - Developing a **water balance** model for the DRB
 - Developing a consistent **drought impact** database (EU JRC)
 - Promoting **smart agriculture** and water use efficiency (FAO)
 - Organizing an international drought **expert workshop** (World Bank)
 - Fostering intersectoral dialogues with **water users**



Thank you!



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