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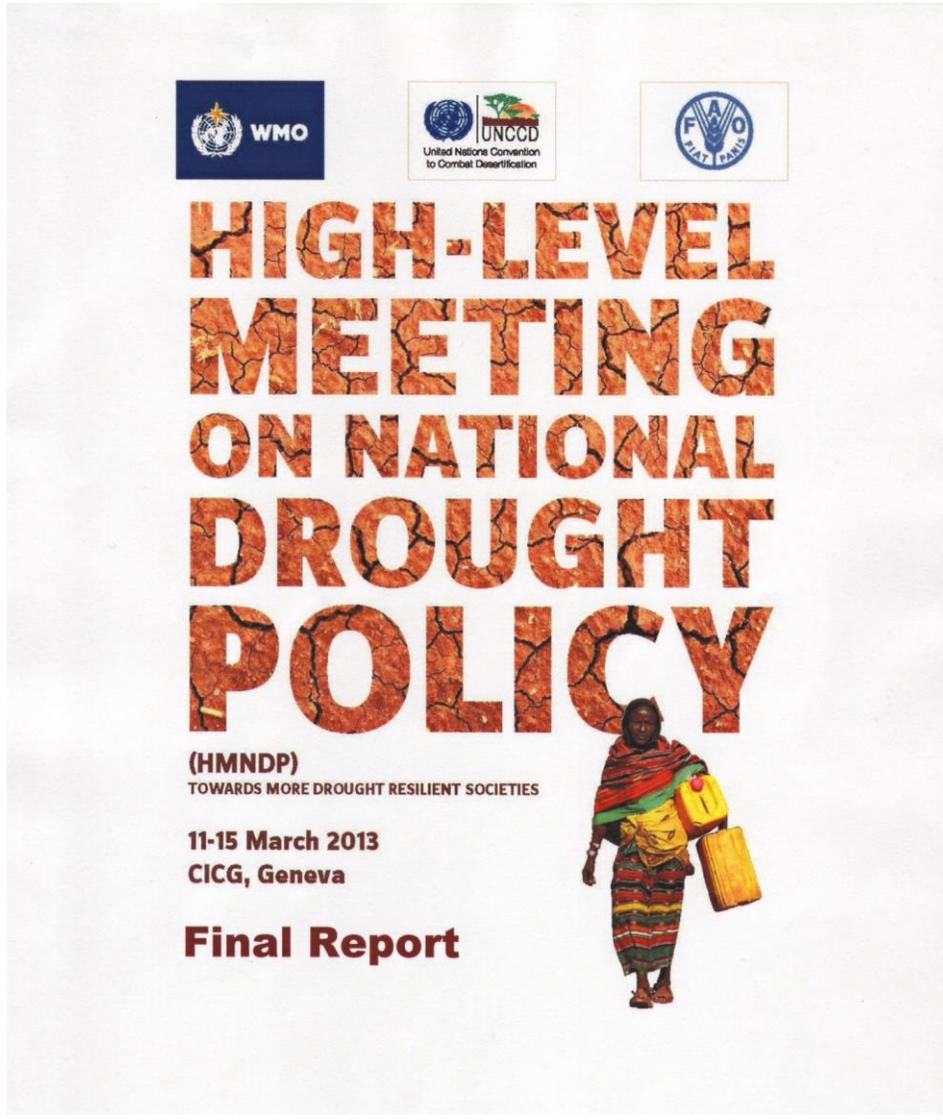
Applied Climate Services Division,
World Meteorological Organization

Drought under Climate Change and the Need for Integrated Risk Management

Beyond Scarcity: Water Scarcity And Drought
Risk Management In The Danube Region
September 20, 2021

- 1. A Framework for Proactive Integrated Drought Management: IDMP**
- 2. Drought and Climate Change**
- 3. Managing the Risks of Drought and Water Scarcity proactively**
- 4. Drought Management in a global Action Framework: The Water and Climate Coalition**

The Integrated Drought Management Programme



The heart of IDMP: The Partners





Overcoming bad habits: Crisis vs. Risk Management:

Weighing the costs and benefits

Crisis Management

- Expensive
 - Costs + costs of inaction
 - Repeats past mistakes
- Post-impact
 - Drought relief
- Treats the symptoms of vulnerability, i.e., impacts
- Rewards poor management of resources
- Increases vulnerability, reliance on government & donors

Risk Management

- Investment
 - Short-term—EWS, networks
 - Long-term—institutional capacity, structural adjustments
- Pre-impact
 - Mitigates and reduces risks
- Identifies and treats the root causes of vulnerability
- Promotes improved stewardship of natural resources
- Builds self-reliance, reduces vulnerability

Source: Don Wilhite, 2015 [link](#)

[Link](#) to further work on the Economic Argument by the IDMP and World Bank

The Three Pillars of Integrated Drought Management



IDMP's Integrated Drought Management Helpdesk

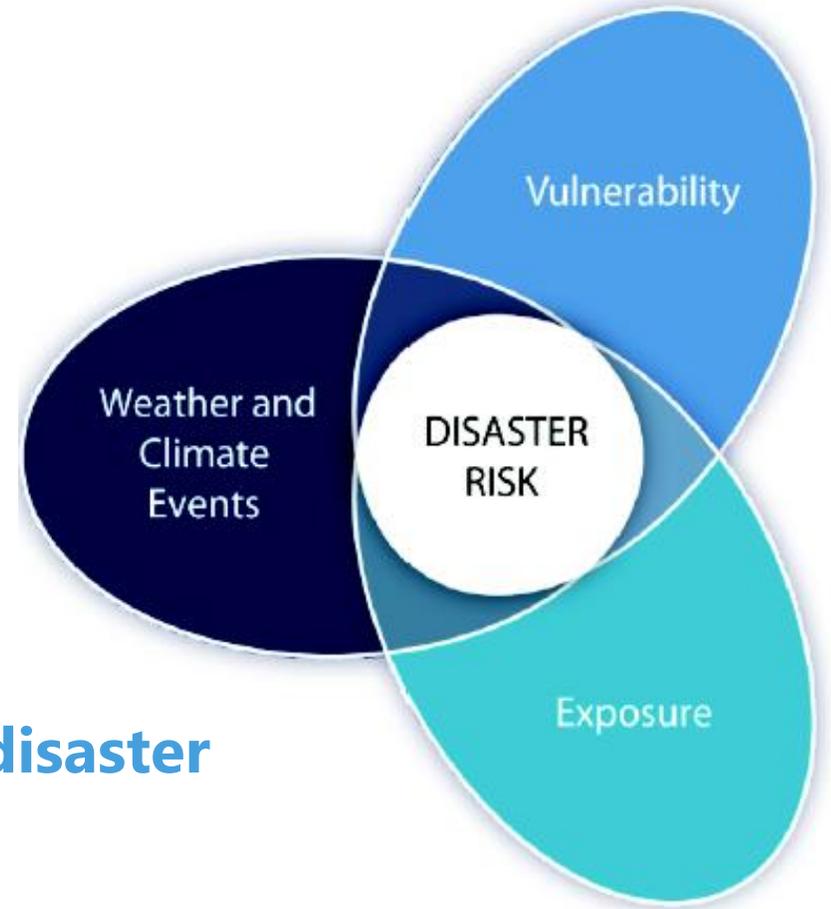
The image shows three interactive buttons for the IDMP helpdesk, each with a title, an icon, a description, and a plus sign in the bottom right corner. The 'Ask' button is highlighted with a blue border.

- Ask**: Represented by a question mark and an information icon. Description: "Ask for assistance on integrated drought management".
- Find**: Represented by a magnifying glass icon. Description: "Find knowledge resources on integrated drought management".
- Connect**: Represented by an icon of people in a circle. Description: "Learn about the activities of IDMP and connect to them".

www.DroughtManagement.info

Drought as a Climate Risk

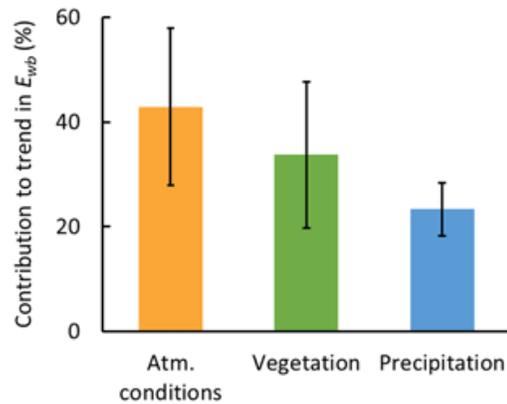
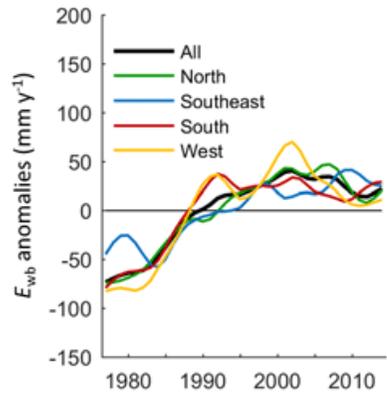
- Drought is a natural phenomena
- Many countries/societies are not adapted to current or “pre-Climate Change” conditions, including droughts
- A drought becomes a disaster if not well managed/prepared
- Climate Change is aggravating this situation though many direct and indirect ways
- This presentation is e.g. not focusing on the increase of vulnerability or exposure



Drought is a climate risk, but not automatically a disaster

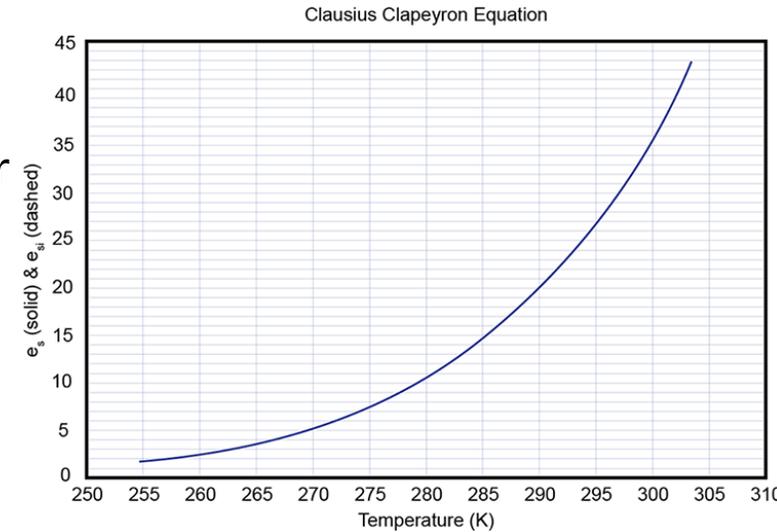
How is Climate Change affecting Droughts

- Warming -> atmospheric water content increases ~7% per 1 °C (Clausius Clapeyron relationship) -> less water in soils and freshwater aquifers
- Increasing temperatures strengthen evaporation

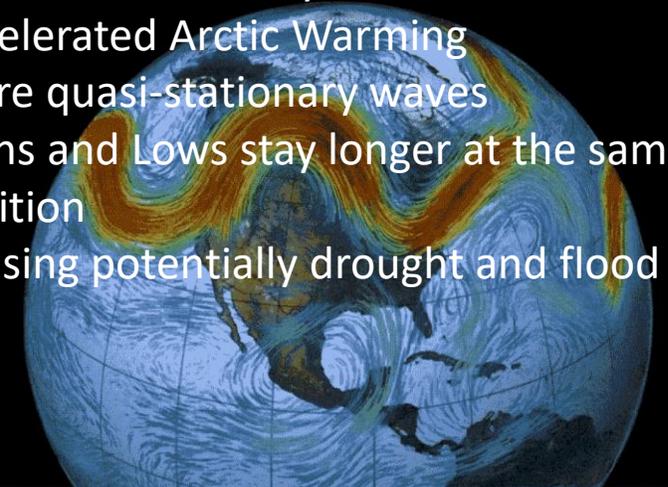


HESS, Duethmann and Blöschl 2018.

- Reduced Snowpack volumes and earlier snowmelt, glacier melting
- Change of weather patterns, e.g. Rossby Waves, El-Nino Southern Oscillation (ENSO), etc.
- Positive feedback of dry soils and diminished plant cover



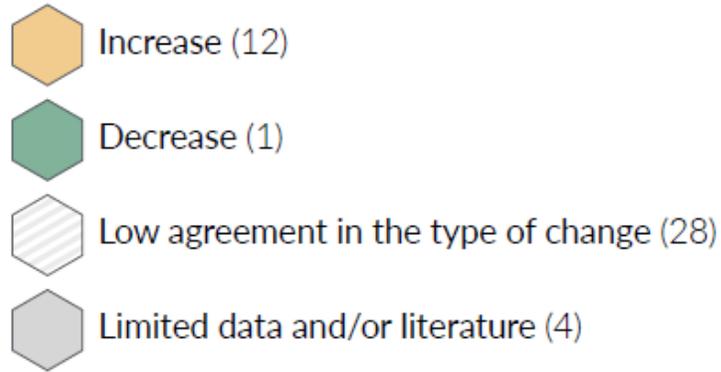
- Waves move usually eastward
- Accelerated Arctic Warming
- More quasi-stationary waves
- Highs and Lows stay longer at the same position
- Causing potentially drought and flood



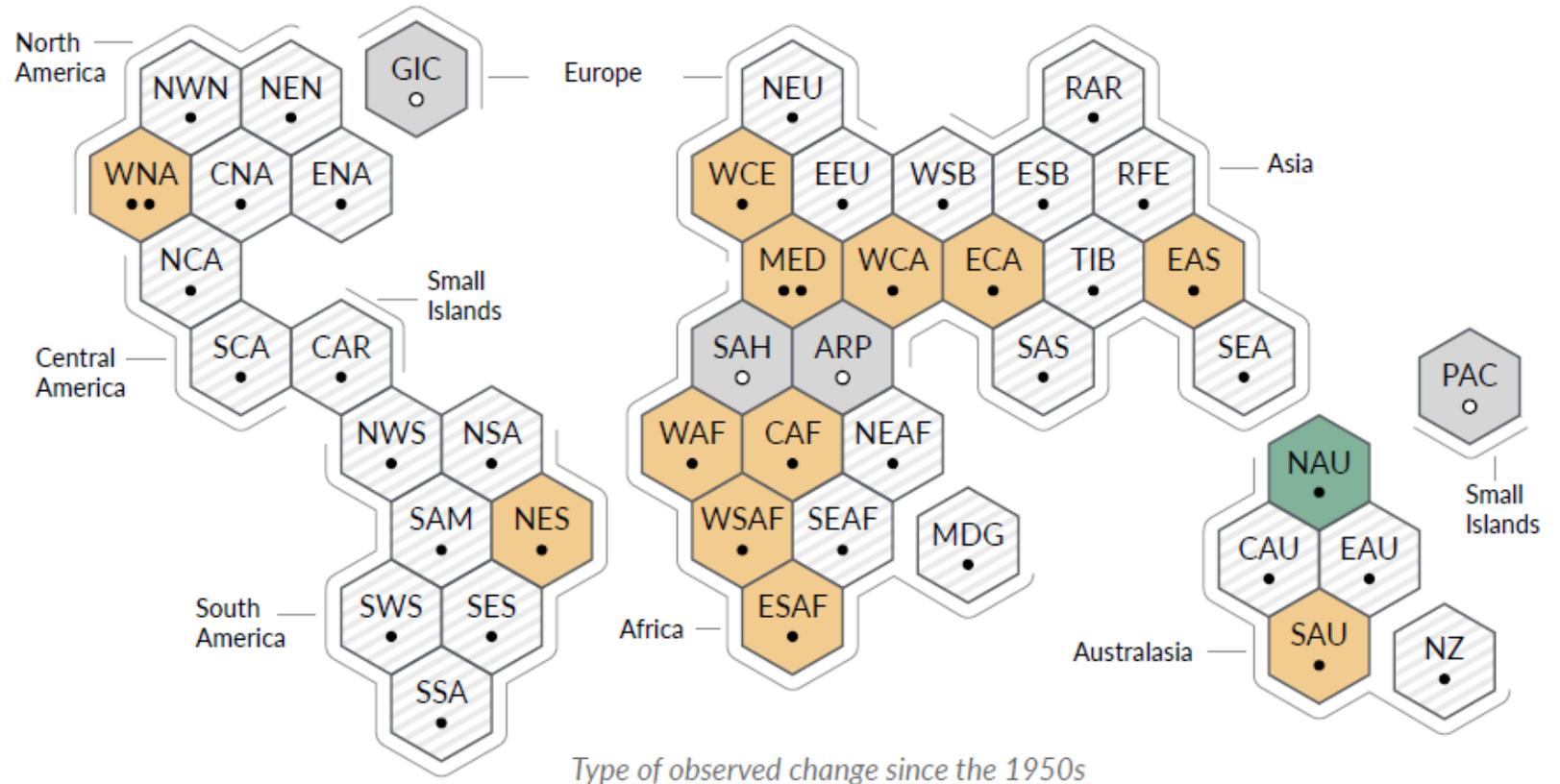
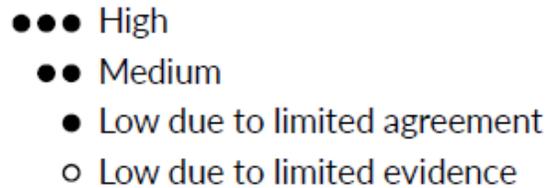
How has Climate Change affected Droughts until now?

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



Confidence in human contribution to the observed change



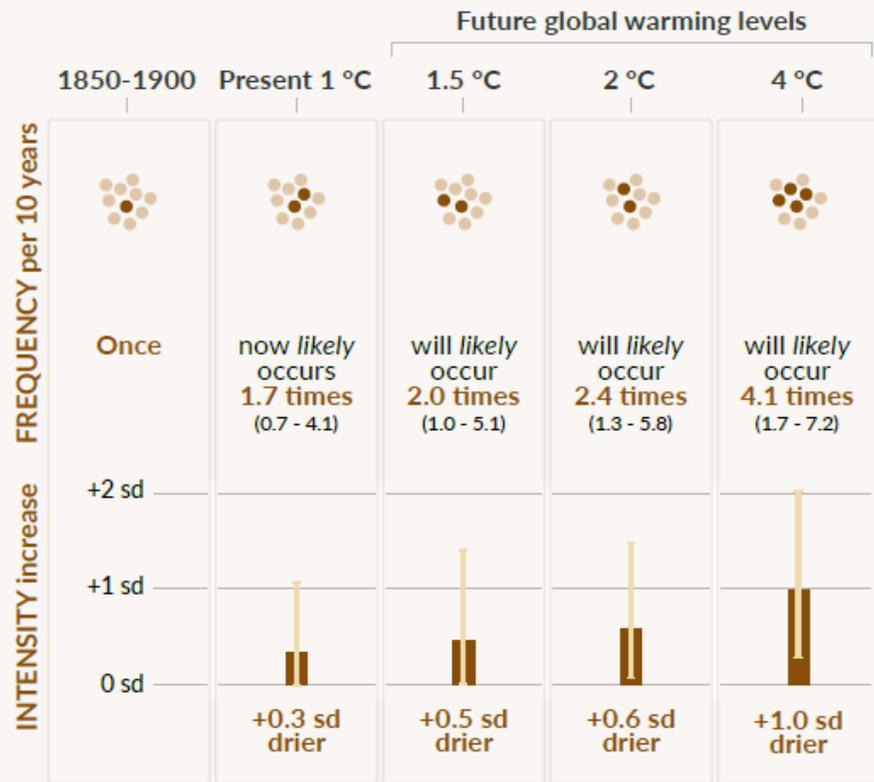
From the just released 6th Assessment Report of the IPCC, WGI:

... and how will it likely affect droughts in the future

Agricultural & ecological droughts in drying regions

10-year event

Frequency and increase in intensity of an agricultural and ecological drought event that occurred once in 10 years on average across drying regions in a climate without human influence



- “With every additional increment of global warming, changes in extremes continue to become larger. For example, every additional 0.5°C of global warming causes clearly discernible increases in the intensity and frequency of hot extremes, including heatwaves (very likely) [...] as well as agricultural and ecological droughts in some regions (high confidence).
- Increases in frequency and intensity of hydrological droughts become larger with increasing global warming in some regions (medium confidence).
- **There will be an increasing occurrence of some extreme events unprecedented in the observational record with additional global warming, even at 1.5°C of global warming.**
- Also, more frequent and/or severe agricultural and ecological droughts are projected in a few regions in all continents except Asia compared to 1850–1900 (medium confidence); increases in meteorological droughts are also projected in a few regions (medium confidence).

6th Assessment Report of the IPCC, WGI

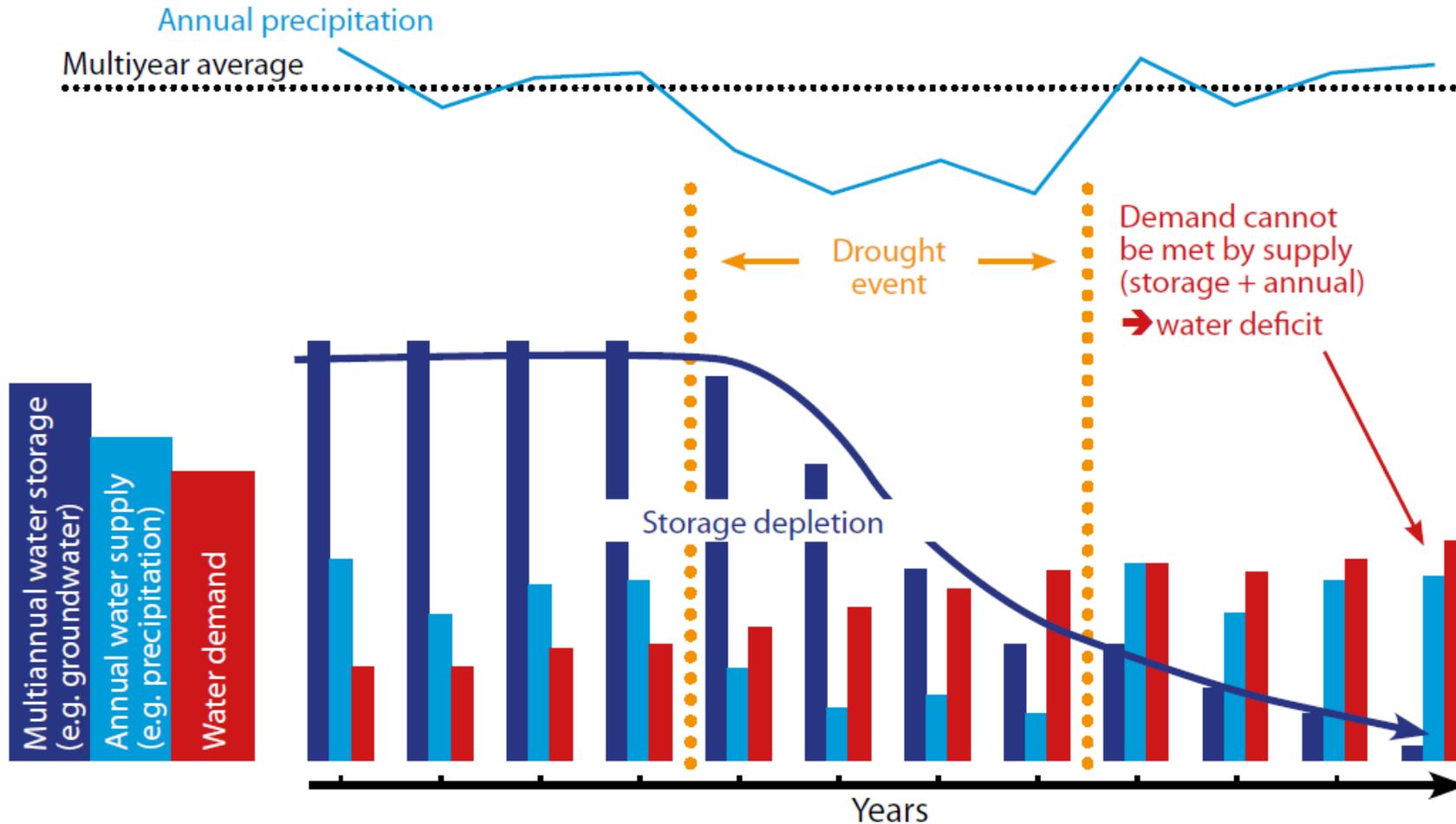
Drought and Water Scarcity

	Water scarcity	Drought
Length	Long-term to permanent	Temporary (weeks to multiyear)
Driving forces	Demand-supply imbalance, human-driven and/or natural (overexploitation, pollution). Climate change can impact both supply and demand	Natural climate variability which can be modified/amplified by climate change
Impacts	Restricted water availability, environmental degradation, desertification	Water shortages, competition, environmental degradation
Consequences	Economic losses, loss in quality of life, loss of life, health risks, migration, aggravation of gender inequality	Famine, economic losses, loss of life, health risks, migration, aggravation of gender inequality
Measures	Long-term IWRM to bring supply and demand back into sustainable balance	Integrated drought management, including (1) monitoring and early warning, (2) vulnerability and impact assessment, and (3) risk mitigation, preparedness and response

Adapted from Hohenwallner et al. 2011

Drought and Water Scarcity are interrelated

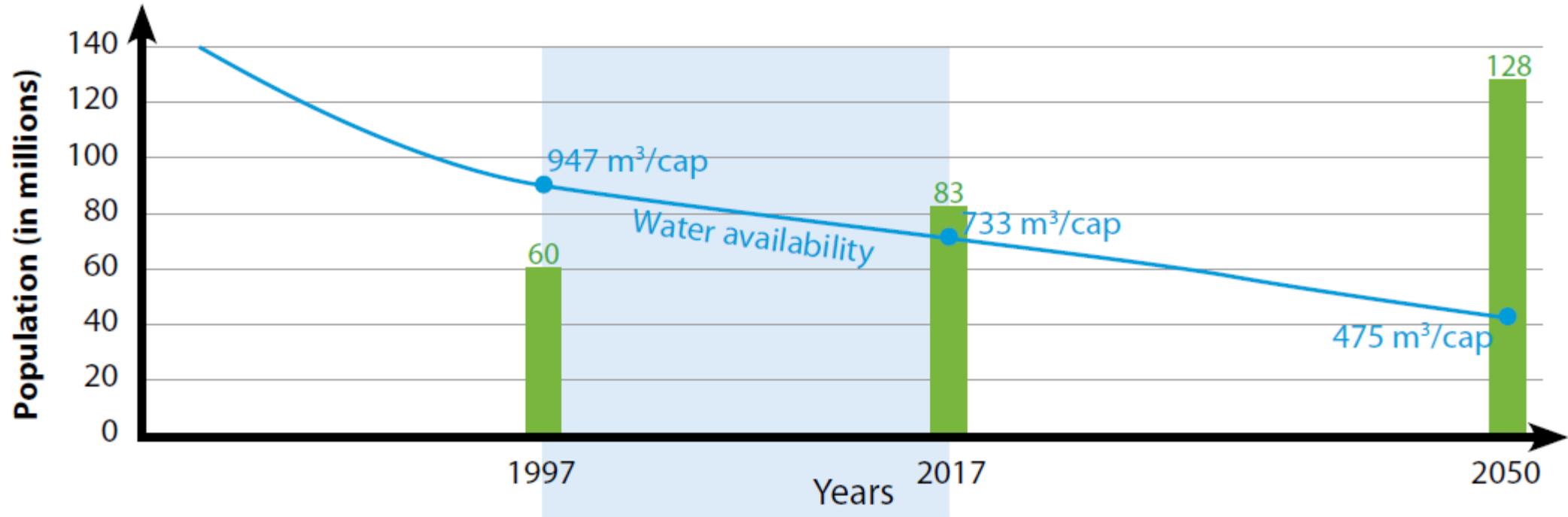
Water scarcity amplified and accelerated by drought



- Drought causes an increase in water demand (red bars)
- The storage depletes (dark blue bars) depletion
- Water deficit, where the expected annual demand can no longer be fully met by the annual water supply and the available water storage.

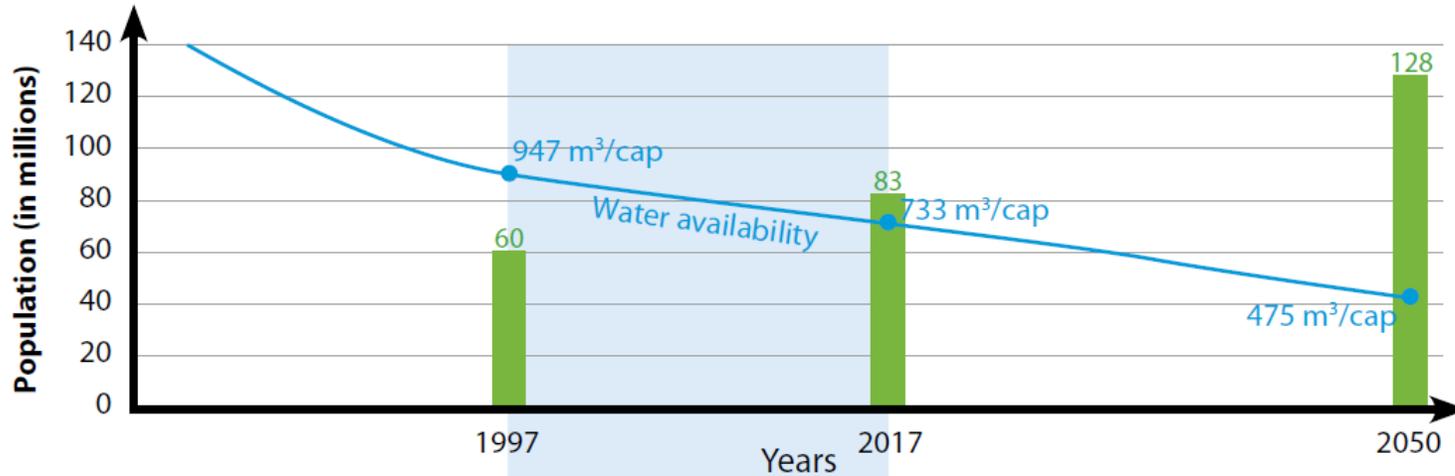
IDMP 2021 (in editing)

Managing the Risks proactively: the example of Egypt

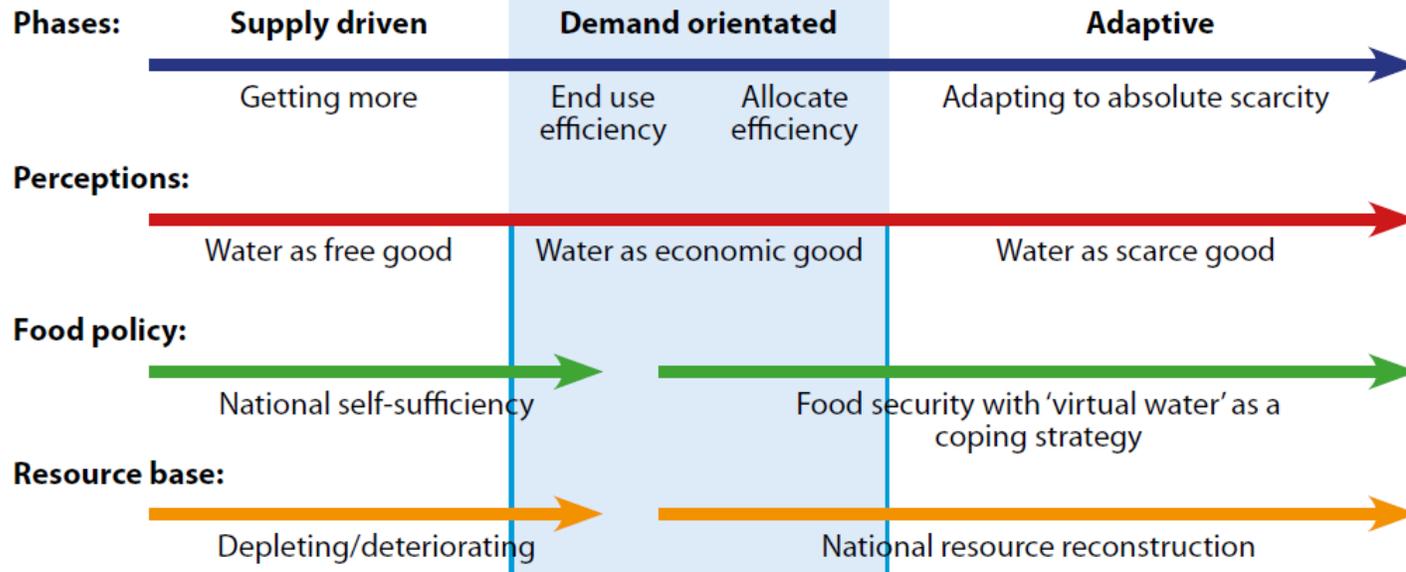


E. Van Beek, personal communication (2018) and based on Turton (1999)

Managing the Risks proactively: the example of Egypt



- Currently, Egypt is the world's largest grain importer
- Egypt's agricultural sector uses 80 % of the nation's water supplies to irrigate crops
- design of better cropping systems and crop intensification may improve water use efficiency
- Reduce leakages

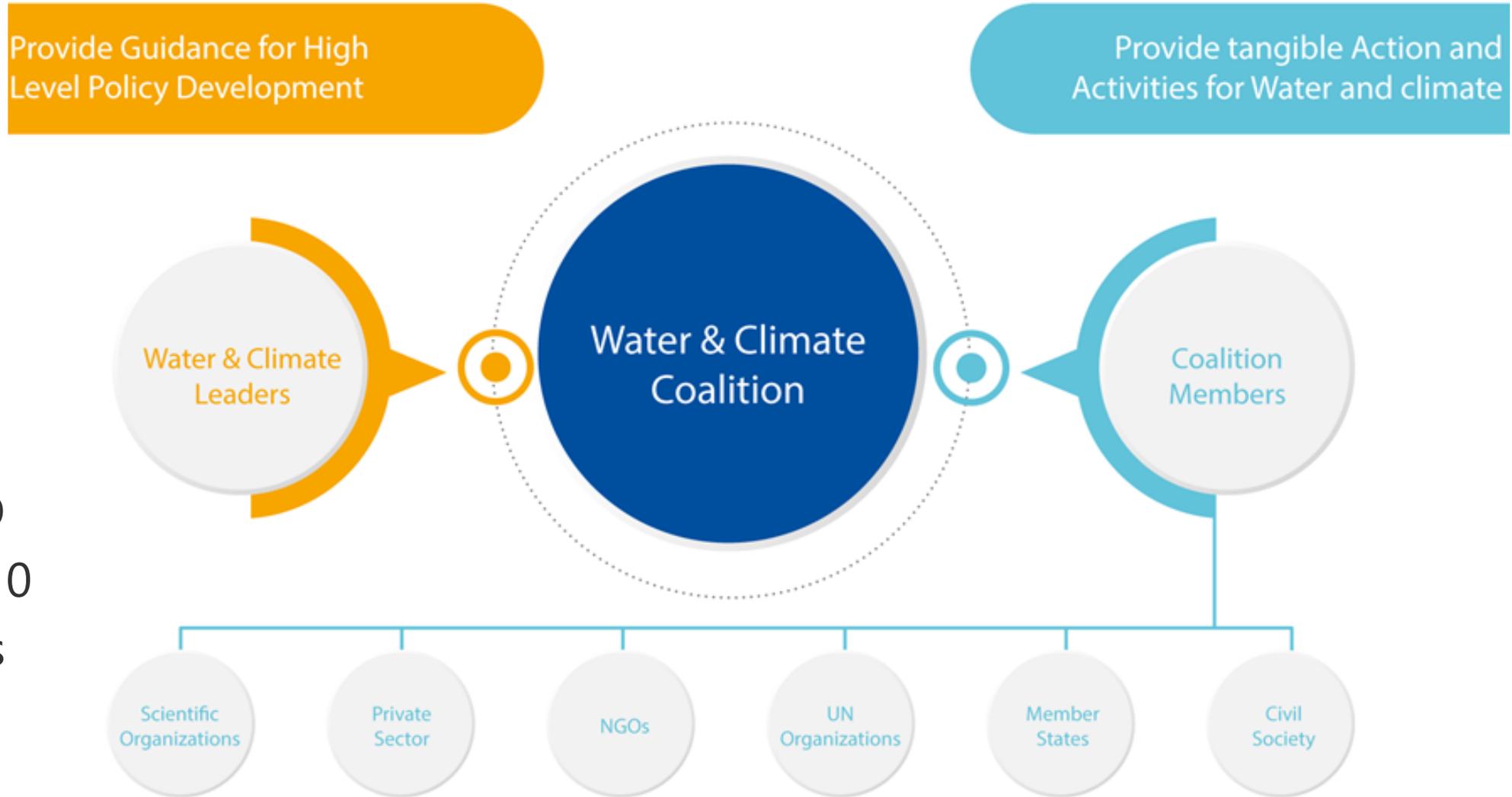


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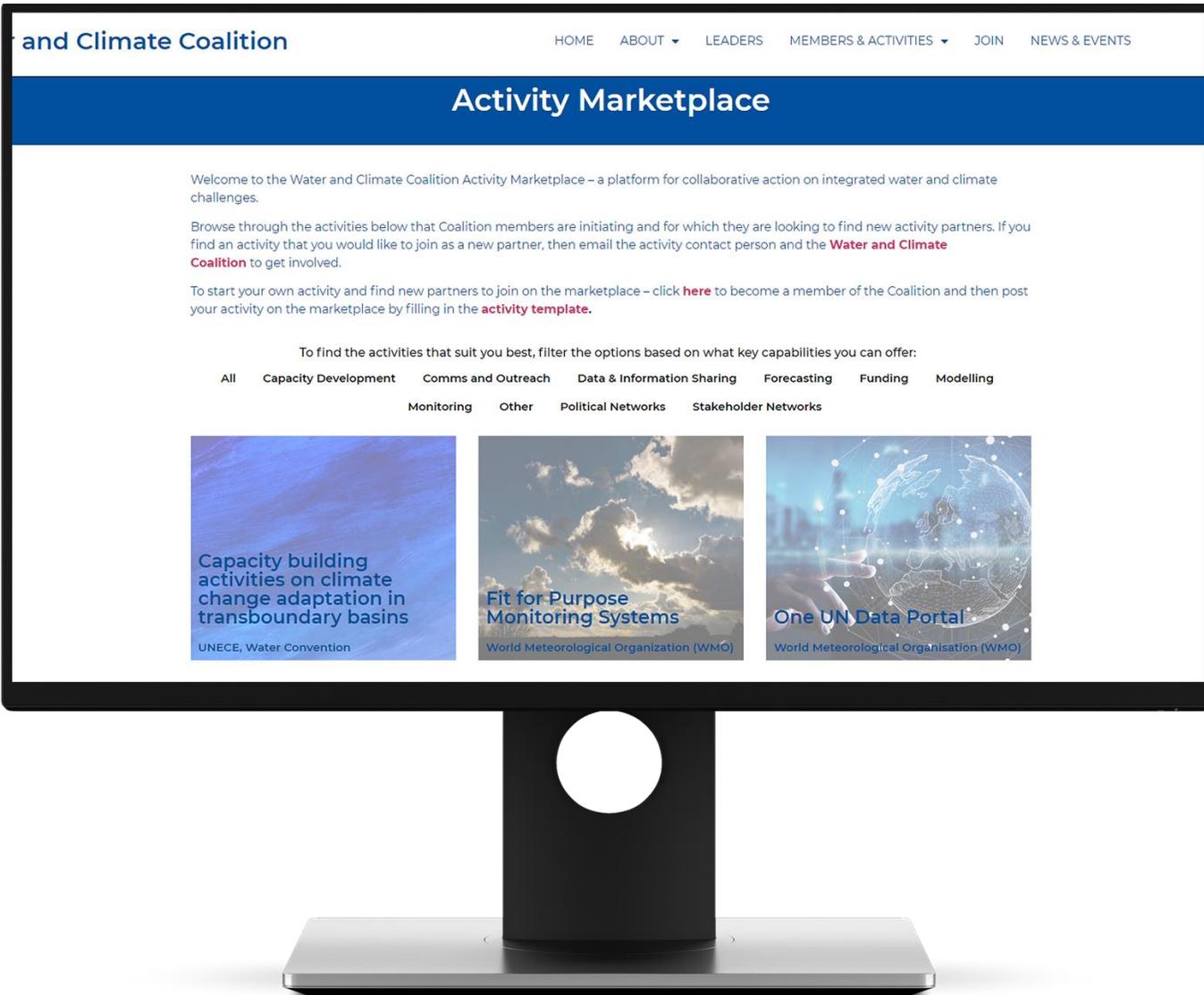
A Global Action Framework for Water: The Water and Climate Coalition

A cross-sectoral water action community under the SDG 6 Accelerator framework

Initiated by WMO and founded by 10 UN Organizations and GWP



Activity Marketplace and Leaders Panel



Water And Climate Leaders Panel

- | | | |
|---|---|--|
|  Mr. Emomali Rahmon
President, Republic of Tajikistan |  Mr. János Áder
President, Hungary |  Mrs. Hilda Heine
Past President, Republic of the Marshall Islands |
|  Mr. Komi Sélom Klassou
Past Prime Minister, Republic of Togo |  Mr. Han Seung-soo
Past Prime Minister, Republic of Korea |  Mr. Carl-Hermann Gustav Schlettwein
President AMCOW; Minister, Republic of Namibia |
|  Mrs. Cora van Nieuwenhuizen
Minister of Infrastructure and Water Management, Kingdom of the Netherlands |  Mr. Abdelkader Amara
Minister, Kingdom of Morocco |  Mrs. Hannele Pokka
Professor; Past Minister, Republic of Finland |
|  Mrs. Haydée Rodríguez
Vice Minister, Republic of Costa Rica |  Mr. Gilbert Hougbo
Chair UN-Water; President IFAD |  Mr. Petteri Taalas
Secretary General WMO |
|  Mr. Howard Bamsey
Chair Global Water Partnership |  Mrs. Lindsey Blodgett
World Youth Parliaments for Water |  Mr. Matthias Berninger
SVP Public Affairs & Sustainability BAYER |
|  Mr. Ernest Gibson
UN Secretary-General's Youth Advisory Group on Climate Change | | |

- ✓ **IDMP is an open community, all hands are needed to cope with droughts**
- ✓ **Integrated Drought Management is Risk Management, not Crisis Management**
- ✓ **Climate Change is increasing the magnitude and frequency of droughts in many regions of the world**
- ✓ **Drought is a natural phenomena, that can be amplified by CC**
- ✓ **Water Scarcity is a mainly human driven imbalance of water supply and demand and both need to be managed proactively**
- ✓ **Drought is part of the global framework for Water under SDG 6 and the Accelerator framework**
- ✓ **The Water and Climate Coalition supports the work on the ground through joint forces to implement interlinked activities and high-level support through the leaders panel**

Get in touch: Integrated Drought Management Helpdesk

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Below the cards is a blue banner with the website address: www.DroughtManagement.info

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