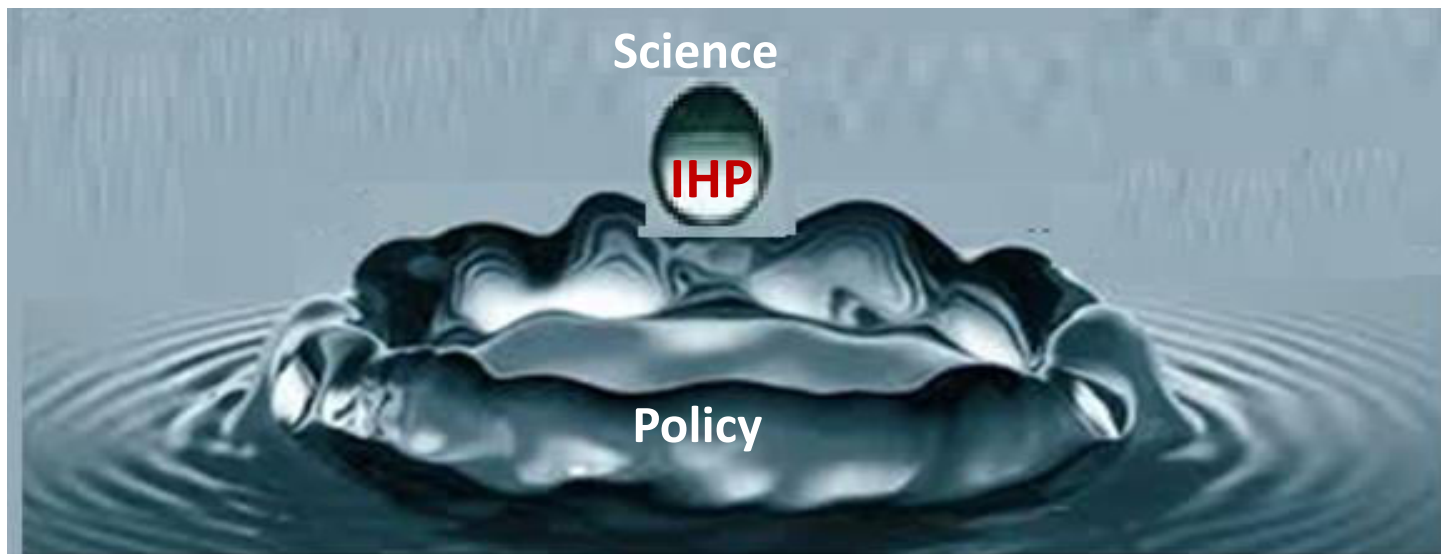


Addressing Global Water Security through IWRM

*SPECIAL SESSION AT INTERNATIONAL WATER RESOURCES ASSOCIATION (IWRA)
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Water Security: 21st Century key challenges



85% of the human population live in arid and semi arid areas

6-8 million human beings are killed each year from water-related disasters and diseases.

750 million people lack access to safe water and 2.5 billion to adequate sanitation.

Water Security: 21st Century key challenges



Almost 85% of the world's total wastewater is discharged without adequate or any treatment.



In just thirty years, freshwater populations species declined by 50%



145 nations have transboundary river basins and there are 445 transboundary aquifers shared by 2-4 countries

Nearly 80% of the world's population is exposed to high levels of threat to water security

IPCC's Fifth Assessment Report on Impacts, Adaptation and Vulnerability (AR5) 2014: Water Security is at risk



“the capacity of a population to safeguard access to adequate quantities of water of acceptable quality for sustaining human and ecosystem health on a watershed basis, and to ensure efficient protection of life and property against water related hazards — floods, landslides, land subsidence and droughts.”

Improve knowledge and innovation to address water security challenges applying IWRM principles.



Theme 1: Water-related Disasters and Hydrological Change, **Challenges**



In many regions, changing precipitation or melting snow and ice are altering hydrological systems, affecting water resources in terms of quantity and quality

Economic losses caused by floods and droughts have been on the rise. They higher fatality rates and relative economic losses expressed as a proportion of GDP are experienced in developing countries.

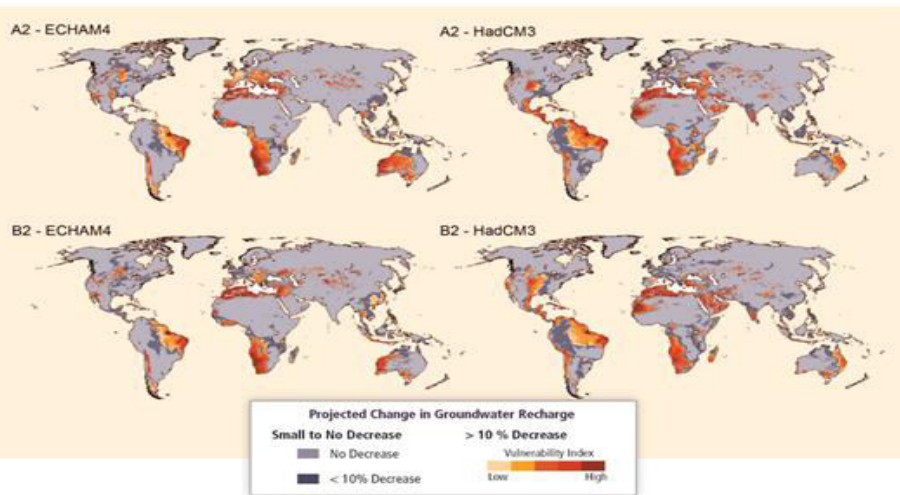
By the end of the 21st century, the number of people exposed annually to a 20th-century 100-year flood is projected to be **three times greater** for RCP8.5 than for RCP2.6



Theme 1: Water-related Disasters and Hydrological Change

- 1.1 **Understanding** coupled **human and natural processes**
- 1.2 **Risk management** as adaptation to global changes
- 1.3 Addressing uncertainty and improving its **communication**
- 1.4 Benefiting from remote sensing **data** and ground truth

Theme 2: Groundwater in a changing Environment, Challenges

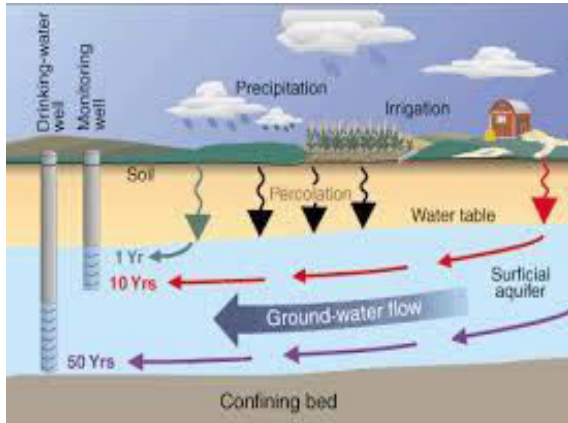


Human vulnerability to climate-change related to renewable groundwater resources by the 2050s. (Döll, 2009,)



1 °C of temperature rise = 4% of the global land area with a groundwater resources decrease of more than 30%

Pollution increase following extreme rain events with concerns for drinking water treatment



Theme 2: Groundwater in a changing environment

- 2.1 Enhancing **sustainable** groundwater resources **management**
- 2.2 Strategies for aquifers recharge
- 2.3 **Adapting** to the impacts of climate change
- 2.4 Protecting and improving **groundwater quality**
- 2.5 Management of **transboundary aquifers**

Theme 3: Addressing Water Scarcity and Quality

Challenges



Significant future reduction of renewable water in quantity, quality and reliability terms

Energy and Food security at risk because of lack of water and increased water demand

Competition among uses and users, exacerbated at the local, regional and global levels

Theme 3: Addressing Water Scarcity and Quality Challenges



Pollution episodes due to higher temperature (eutrophication), heavy rainfall (sweeping pollutants from soil to water courses) and droughts (reduced dilution)



Risks to the quality of drinking water even with conventional treatment



Theme 3: Addressing Water Scarcity and Quality

- 3.1 **Management, allocation, and efficient use** of water resources
- 3.2 Dealing with present water scarcity and developing foresight to **prevent undesirable trends**
- 3.3 **Tools for stakeholders involvement** and awareness, and **conflict resolution**
- 3.4 Water quality and pollution issues within an **IWRM** framework (**legal, policy, institutional and human capacity**)
- 3.5 Innovative tools for safety of water supplies and **controlling pollution**

Vulnerabilities and Risks: Water Uses – ex. Municipal Services

With more than half of the world population living in cities under conditions of climate change, water utilities are confronted with:

- **Less natural storage of water** (ice melting and higher evapotranspiration)
- **Higher water availability variation** and shift in timing of river flows
- **Higher water demand** due to higher ambient and water temperatures
- **Higher competition** for the resource
- **Higher pollution** problems
- **Insufficient treatment capacity** to deal with increased pollution problems

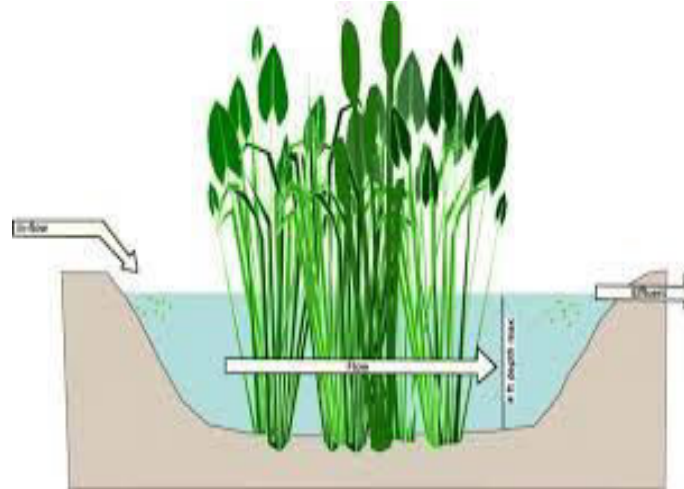




Theme 4: Water and human settlements of the future

- 4.1 Game changing **approaches and technologies**
- 4.2 **System wide changes for integrated management approaches**
- 4.3 **Institution and leadership for beneficiation and integration**
- 4.4 Opportunities in **emerging cities in developing countries**
- 4.5 **Integrated** development in **rural human settlement**

Theme 5: Ecohydrology, engineering harmony for a sustainable world, **Key risks**



Under high competition scenarios, **water for ecosystems** are those more **limited**

Except in areas with intensive irrigation, the **impacts on the ecological flow** are expected to be **stronger** than historical impacts due to anthropogenic causes

By the 2050s, climate change is projected to impact river flow characteristics more **strongly than dam construction and water withdrawals** have done up to around the year 2000



Theme 5: Ecohydrology, engineering harmony for a sustainable world

- 5.1 **Hydrological dimension of a catchment** (threats and opportunities for a sustainable development)
- 5.2 **Shaping of the catchment ecological structure for ecosystem potential enhancement** — biological productivity and biodiversity.
- 5.3 **Ecohydrology system solution and ecological engineering** for the enhancement of water and **ecosystem resilience and ecosystem services**
- 5.4 **Urban Ecohydrology** — storm water purification and retention in the city landscape, potential for improvement of health and quality of life.
- 5.5 Ecohydrological regulation for sustaining and restoring **continental to coastal connectivity and ecosystem functioning**

- Of the global **cost** of water-sector adaptation, most (near 85%) is occurring in developing countries where there are many opportunities for anticipatory adaptation.
- **Barriers** to adaptation include
 - lack of human and institutional capacity
 - lack of financial resources
 - lack of awareness
 - lack of communication



How should **water management** be modified in the face of climate change?



RESEARCH AND INNOVATION

Long-term planning (over several decades) is needed for a future that is highly uncertain.

EDUCATION

A flexible portfolio of low regret solutions producing benefits regardless of the impacts of climate change

AWARENESS RAISING

Use current available experience on adapting policies and practices to the weather.



Theme 6: Water education, key for water security

- 6.1 Enhancing **tertiary water education and professional capabilities** in the water sector
- 6.2 Addressing **vocational education** and training of water **technicians**
- 6.3 Water education for **children and youth**
- 6.4 Promoting awareness of water issues through **informal water education**
- 6.5 Education for transboundary water cooperation

How should **water management** be modified in the face of climate change?



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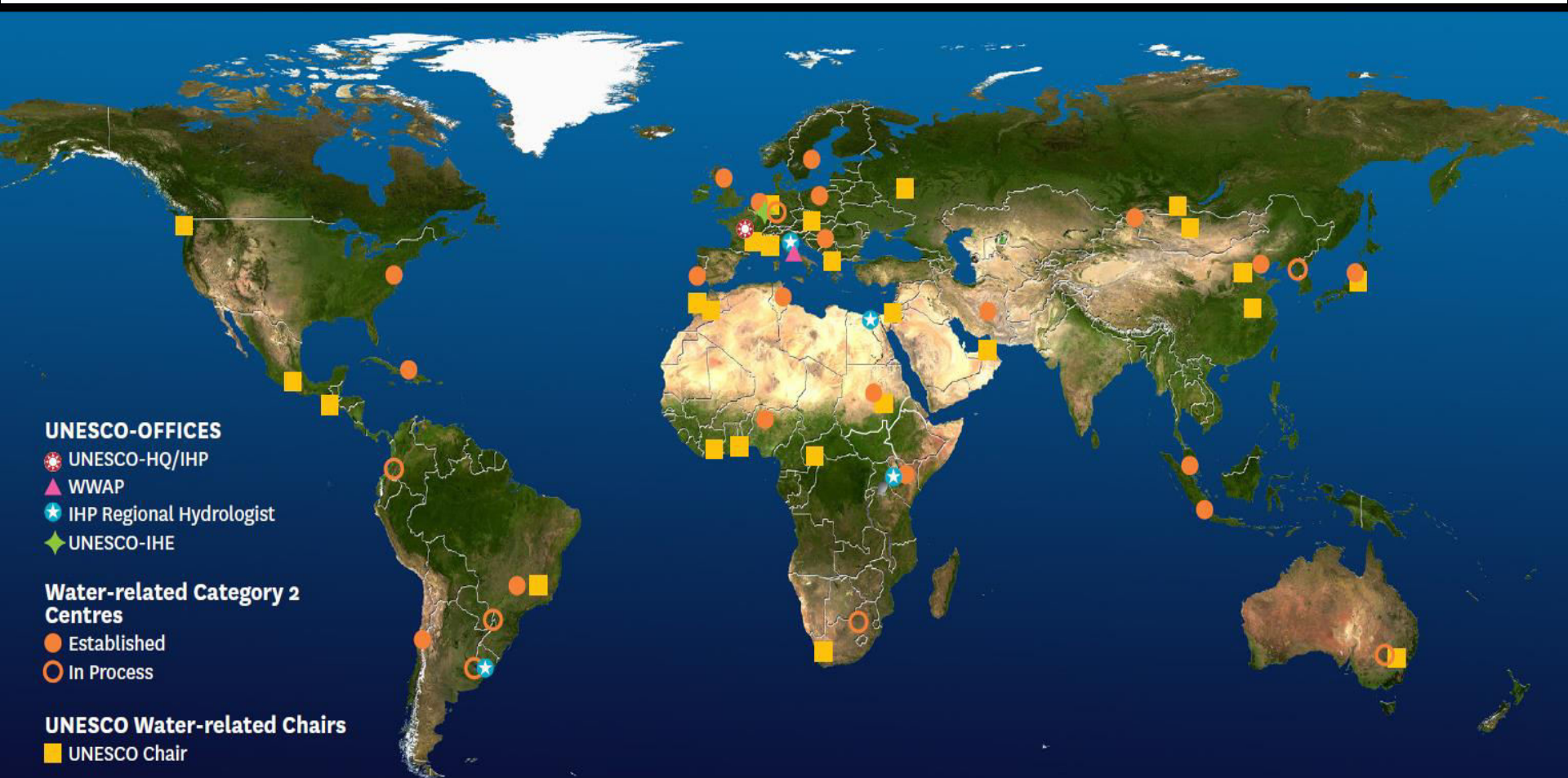
EDUCATION

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AWARENESS RAISING

Use current available experience on adapting policies and practices to the weather.

The UNESCO Water Network



27 centres approuvés, 22 accords signés (établis)
5 nouveaux centres en cours de création
30 chaires relatives de l'eau