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# Regional Bureau for Science and Culture in Europe (BRESCE)

Engelbert Ruoss,  
Director





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**Water, the key resource**

**What UNESCO is doing**

**Future challenges and approaches**





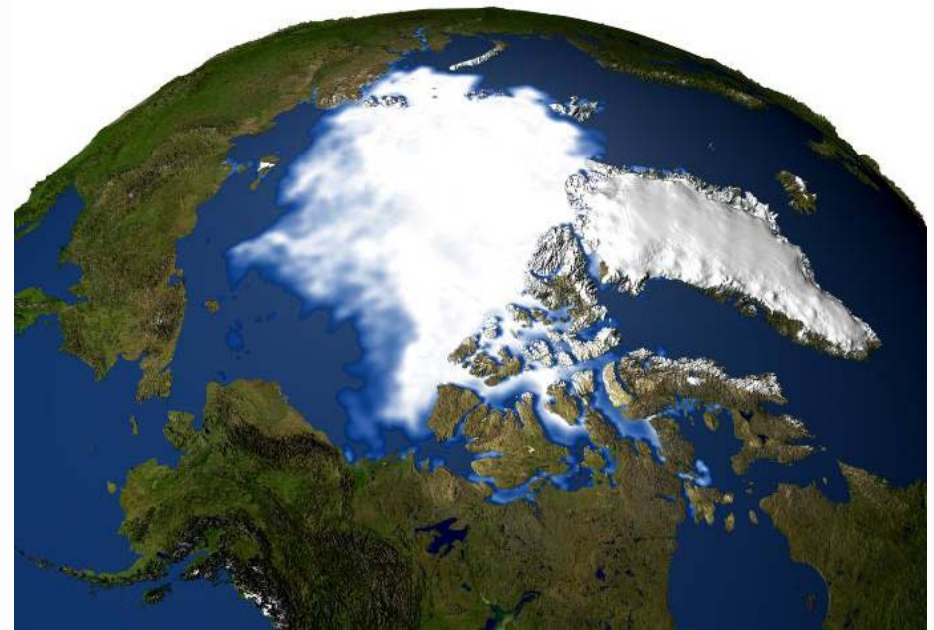
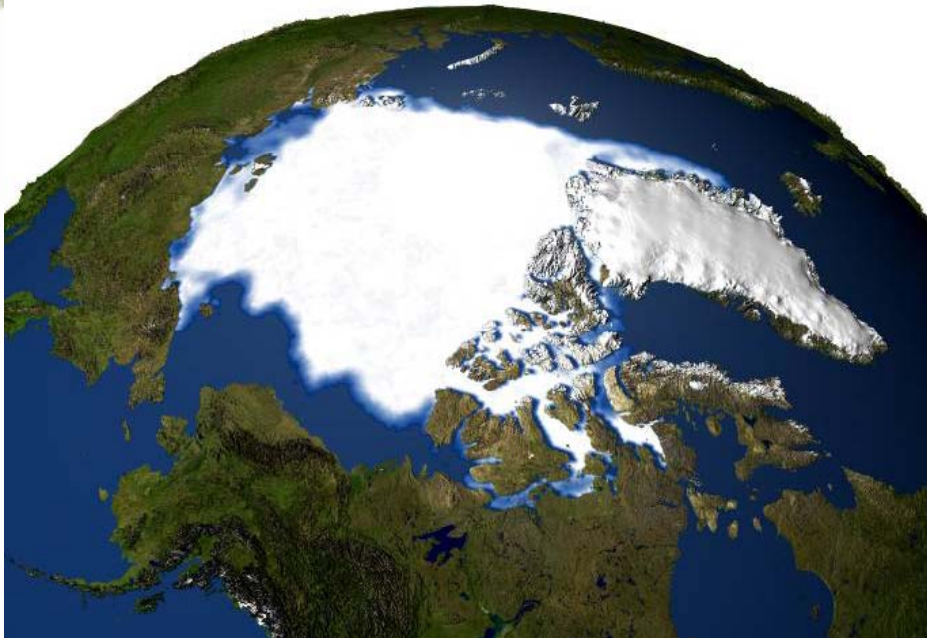
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# The water crisis in the World and in Europe

## Some evidences of Climate Change: North Pole

1979



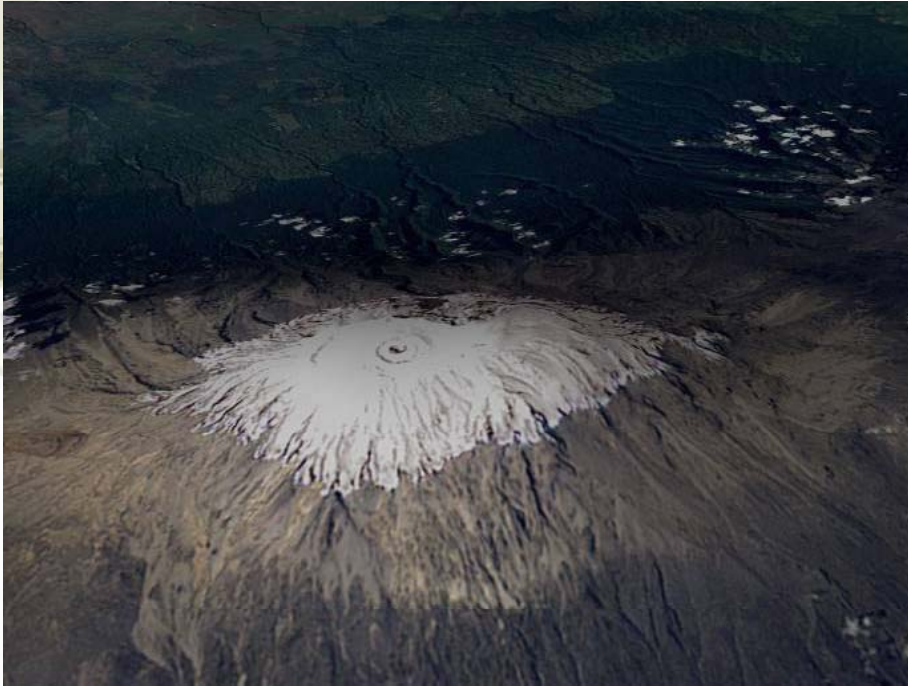




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## Kilimanjaro as it was in 1993...



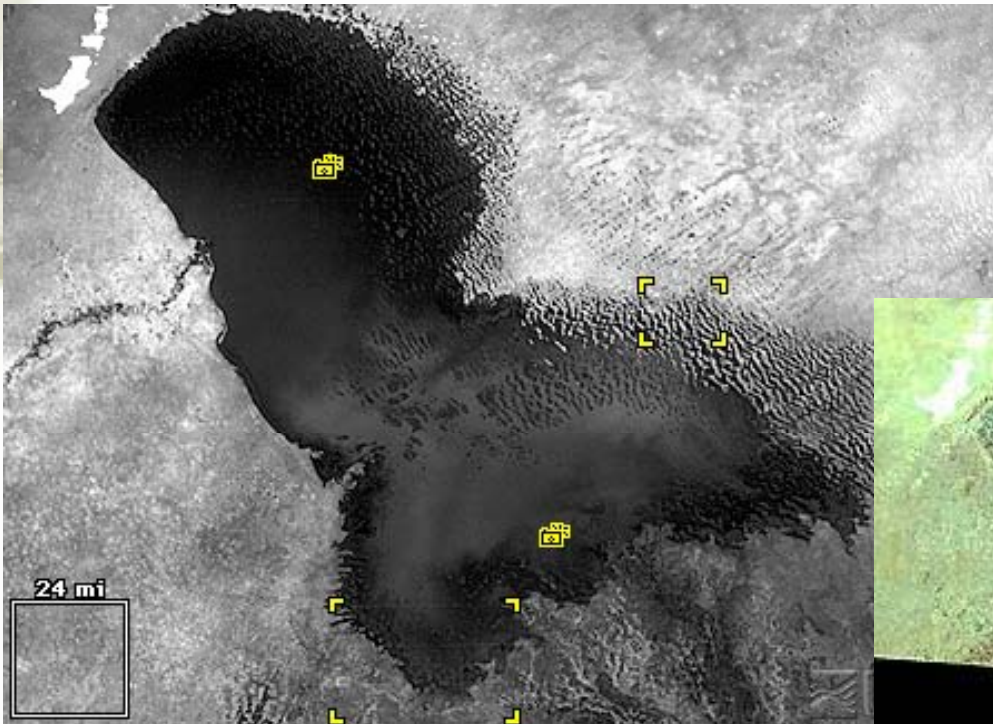
... and today (2000)!



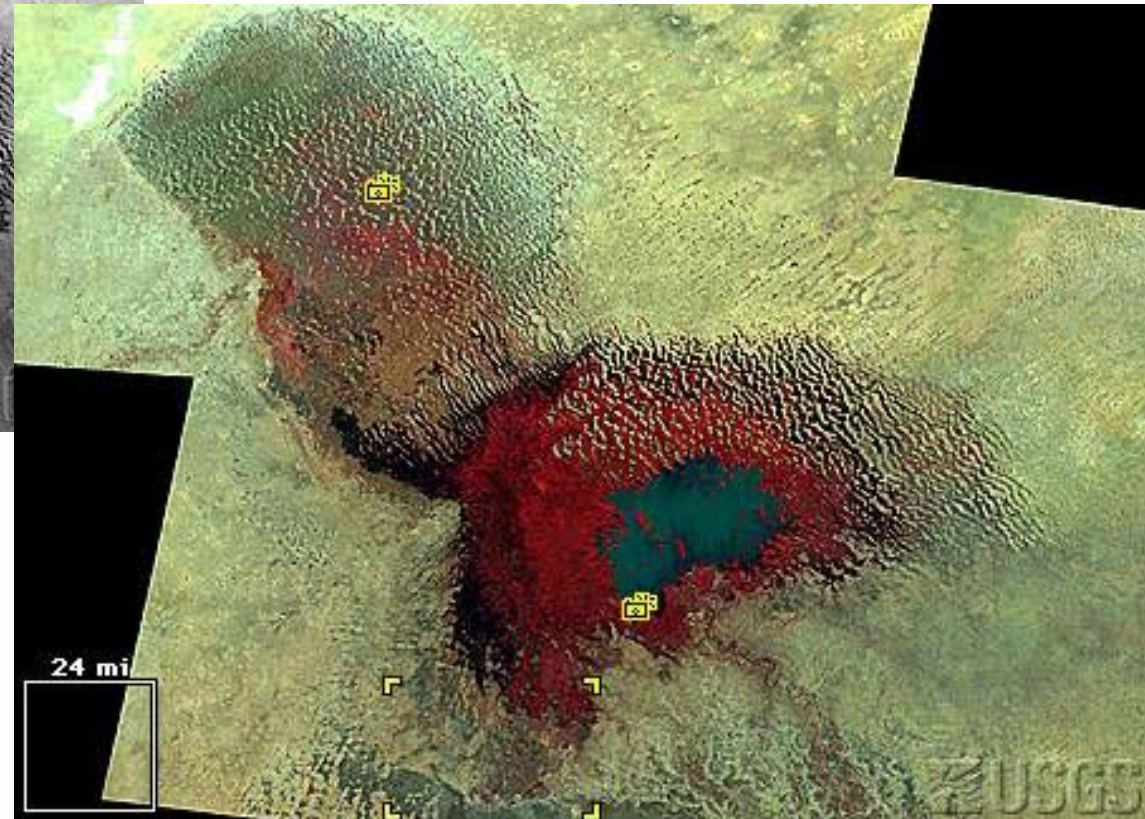




## Lake Chad in 1973...



... and today (2001)!







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**Water is always..... TOO MUCH .....**



**or .... NOT ENOUGH!**







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## Changes are now effectively perceived...



Le temperature sono arrivate fino a 45-46 gradi al Sud. Ancora vittime per l'afa: 2 in Italia e 9 in I

### Mai così caldo, incendi in

L'ANALISI

Il Paese nella morsa del vento d'Africa

LUCA MERCALLI

L'ESTATE mediterranea inizia infuocata al Sud Italia. Ieri pomeriggio gli osservatori meteorologici dell'Aeronautica Militare misuravano 45 gradi a Bari, 44 a Catania, 43 a Lecce. Sono valori prossimi ai massimi storici assoluti registrati in oltre 50 anni in queste località. Ma un po' tutte le regioni a Sud del Lazio hanno registrato picchi ben oltre i 35 gradi. Per fortuna l'umidità relativa estremamente ridotta, spesso attorno al 10 per cento.

SEQUE A PAGINA 11



Una fontana di Milano

CIANCIULLO, LORELLO e REGGIO ALLE

**Positive proof of global warming.**



2010  
?

18th  
Century

1900

1950

1970

1980

1990

2006



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## Human dimension of today's water situation

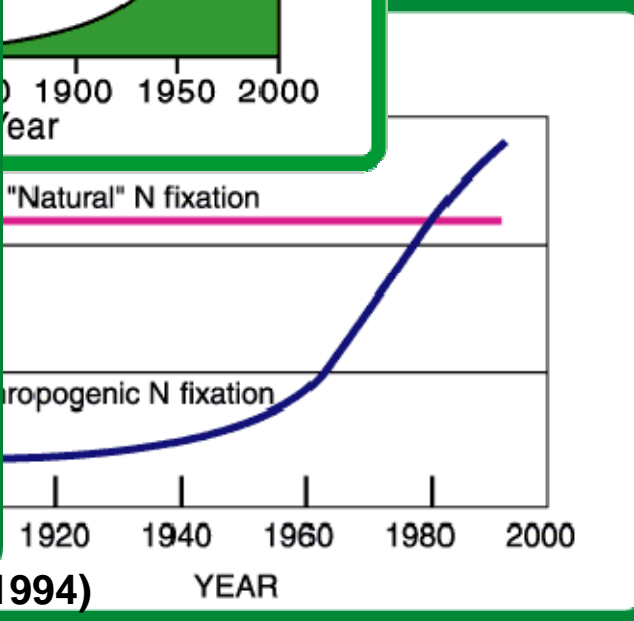
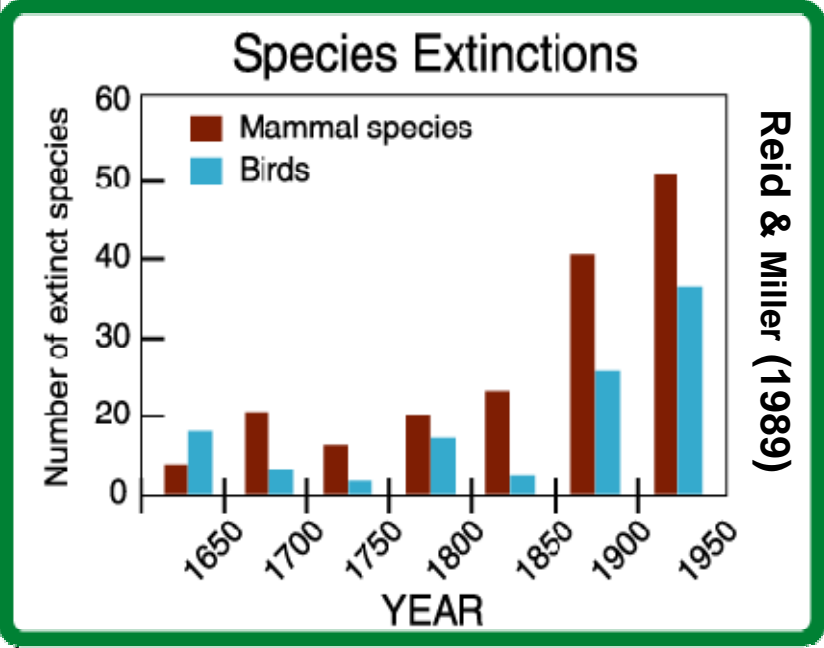
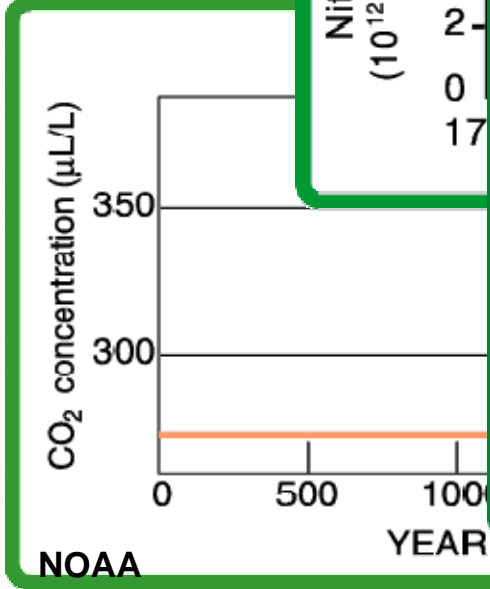
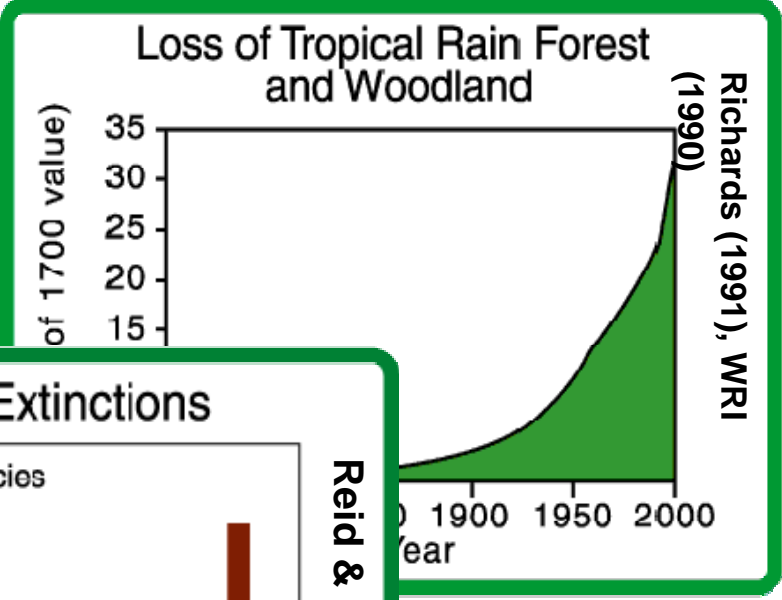
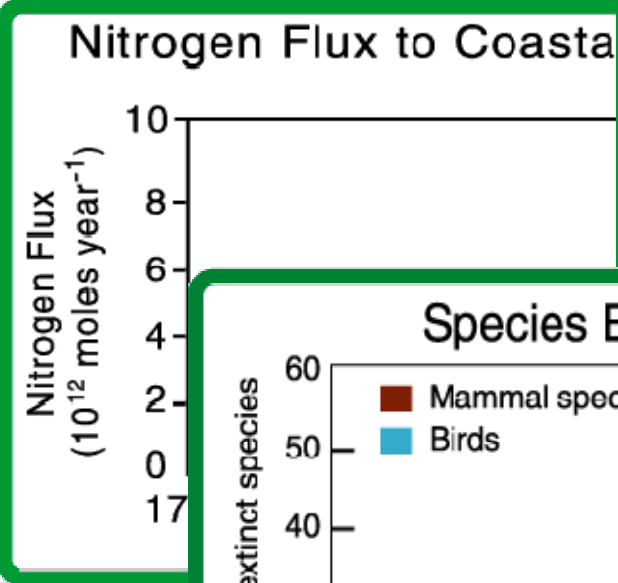
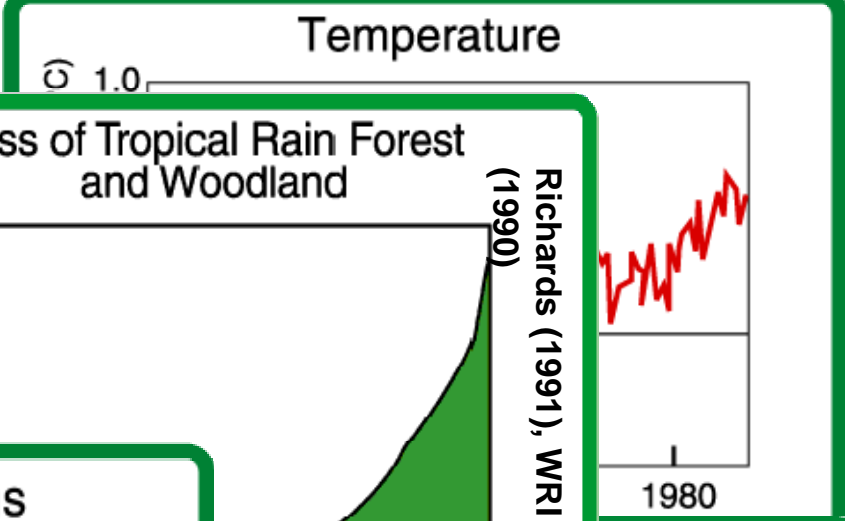
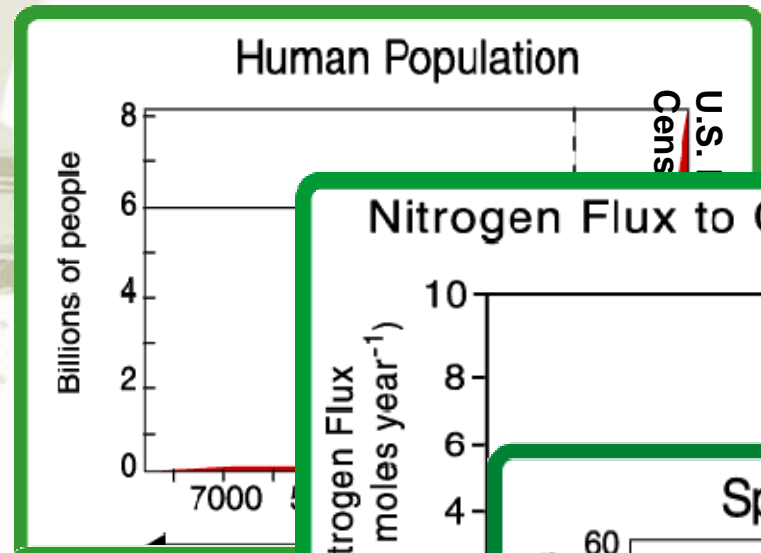
**Climate Change is definitely one of the major drivers of the water crisis, but we should not forget about:**

- **Human population growth;**
- **Urbanization**
- **Pollution**
- **Misuse of resources**
- **Bad management of resources**
- **Conflicts**





# GLOBAL CHANGE as a constellation of changes, with NATURAL + HUMAN and SOCIAL dimensions...





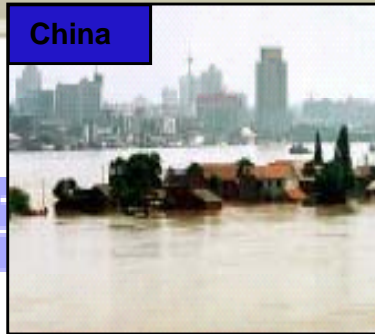


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Germany



China



Korea

	Flood		Drought
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USA



Kenya

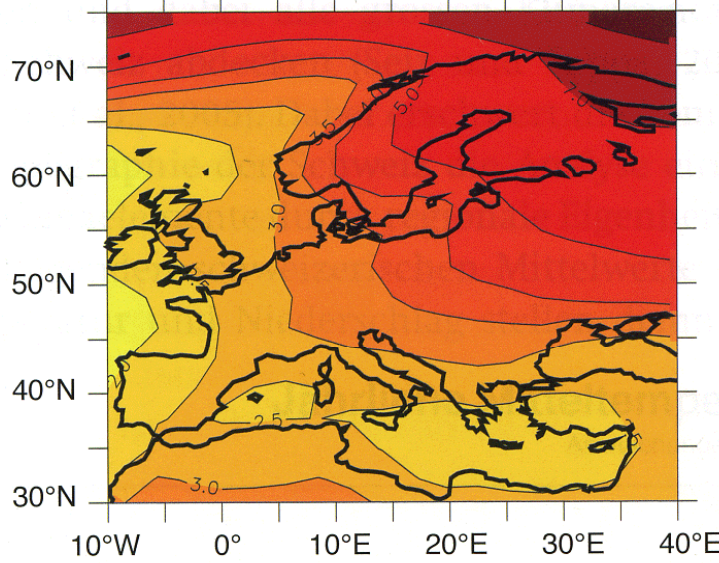
**Need to develop risk management on water hazard in order to secure human life and ensure sustainable socio-economic development and poverty alleviation.**



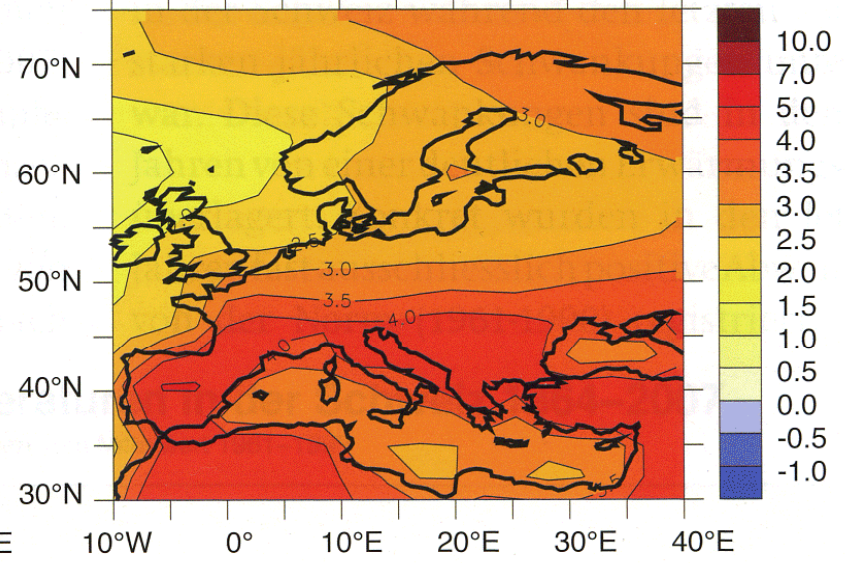


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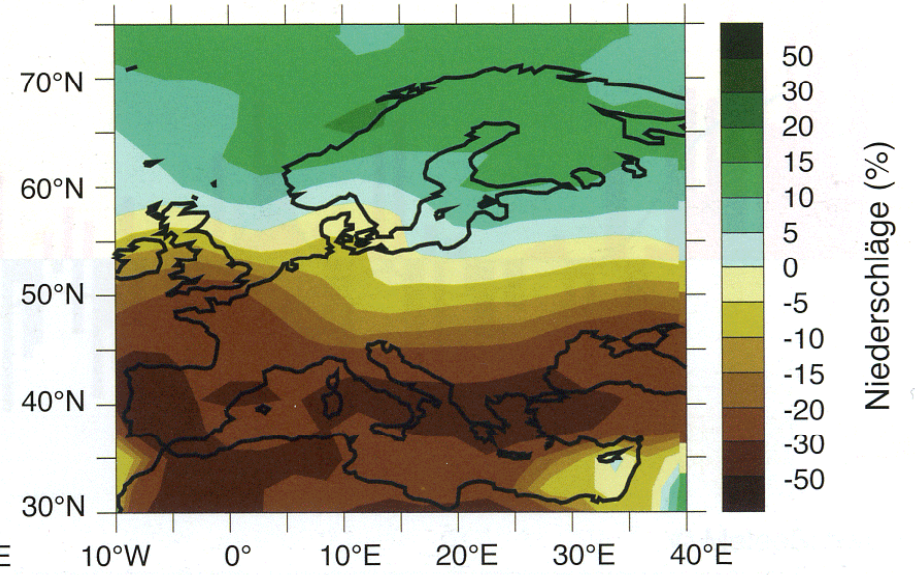
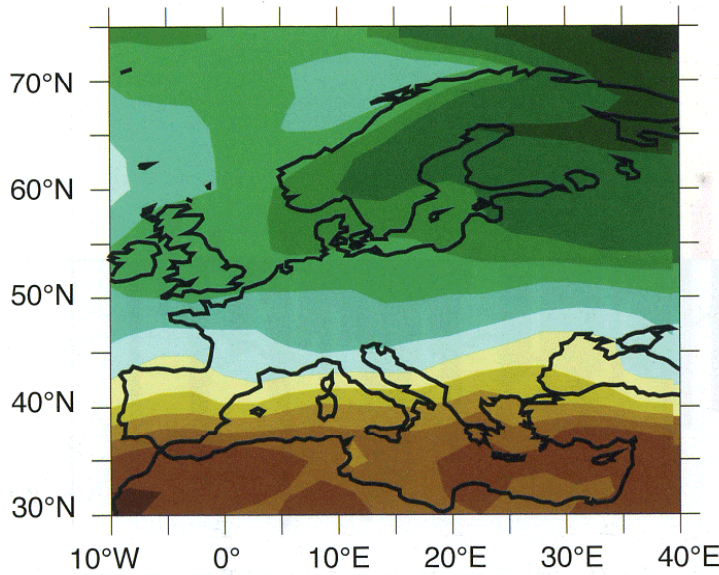
## Winter (Dezember - Februar)



## Sommer (Juni - August)



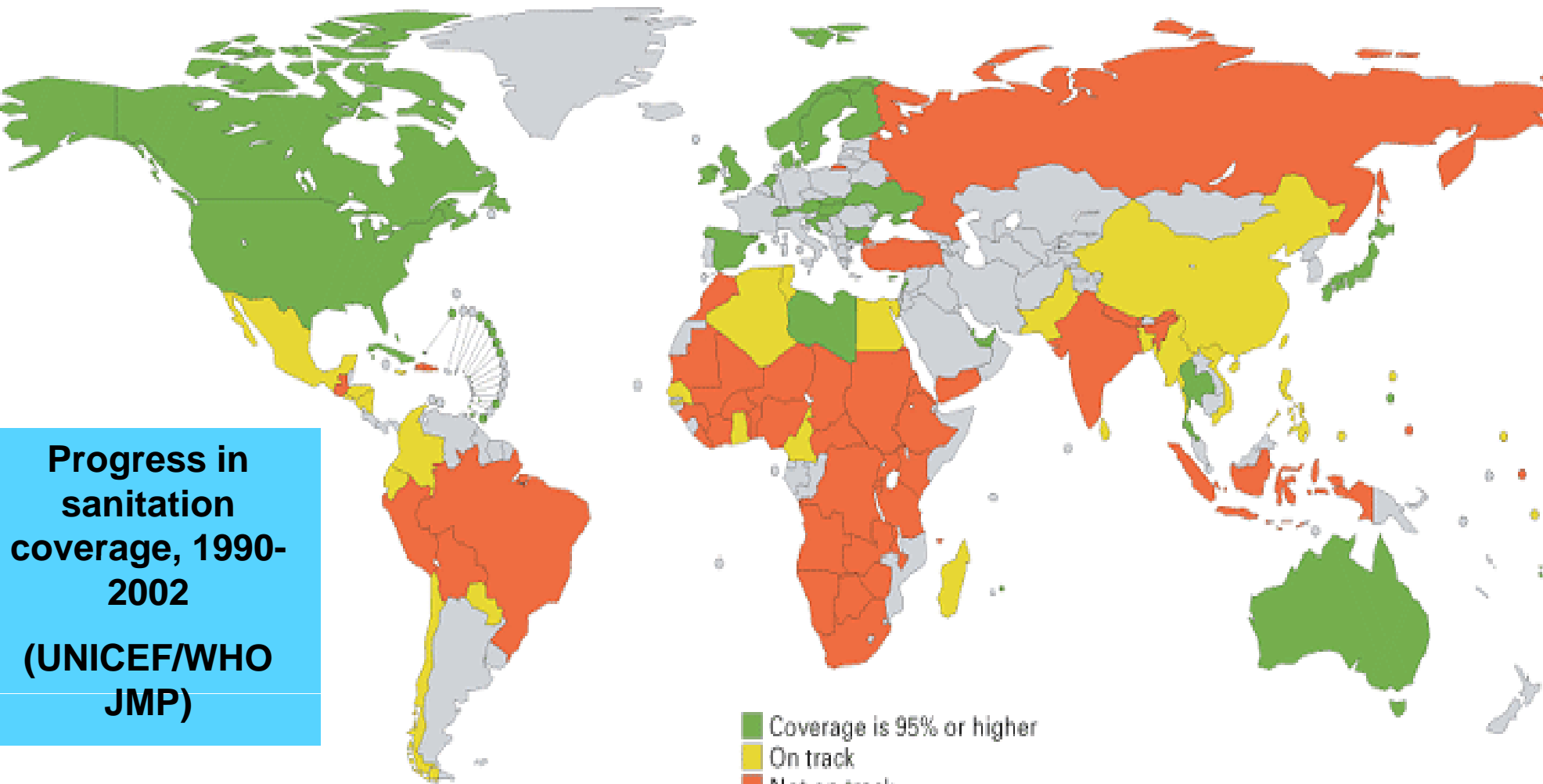
Temperaturen (°C)




Niederschläge (%)



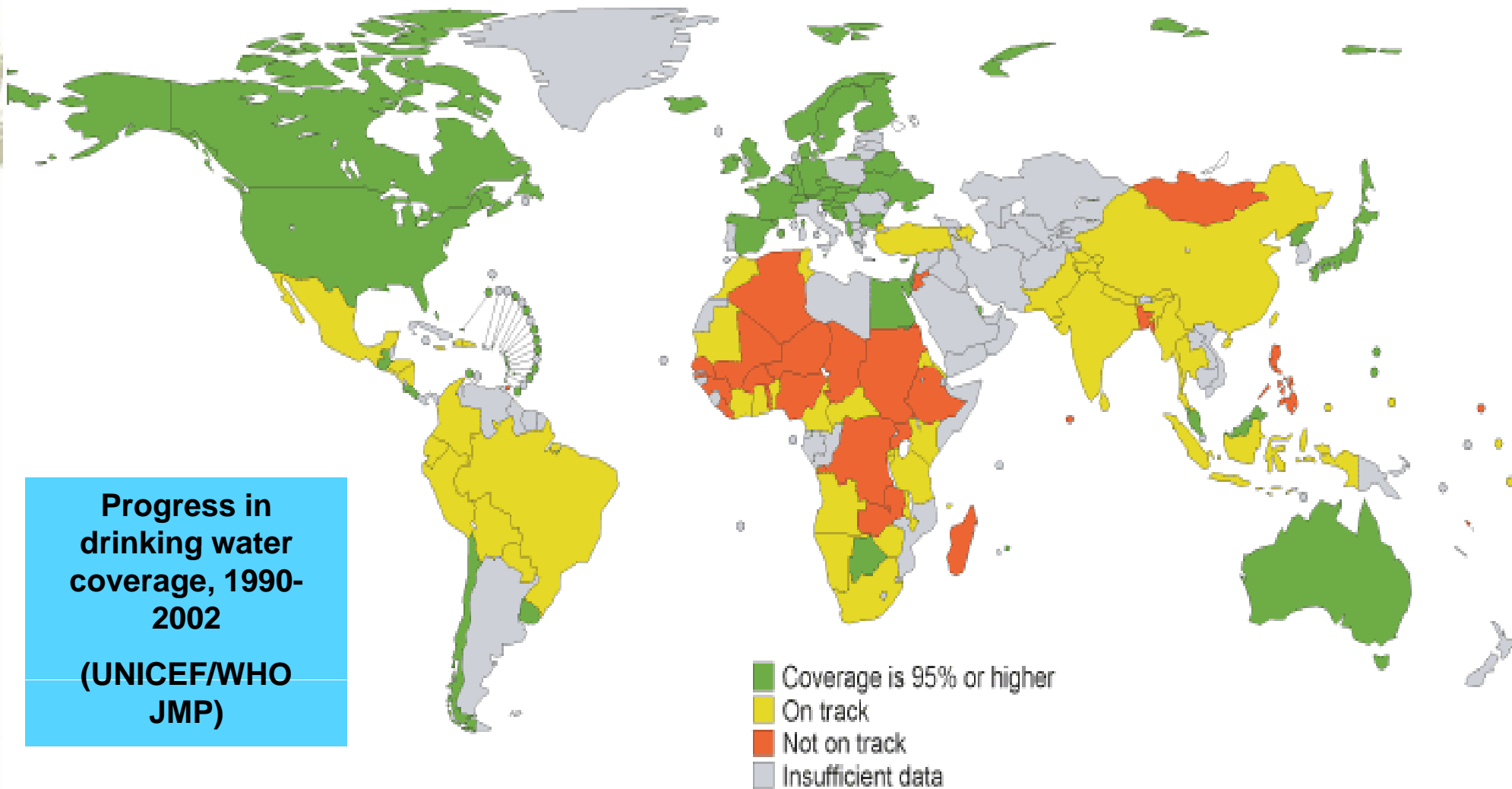
# Many countries not on track to reach MDG sanitation target...



**Progress in sanitation coverage, 1990-2002 (UNICEF/WHO JMP)**

-  Coverage is 95% or higher
-  On track
-  Not on track
-  Insufficient data

# The sub-Saharan Africa will not reach MDG water target...







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# DESERTIFICATION



CARTA DELLE AREE SENSIBILI  
ALLA DESERTIFICAZIONE





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**The global water situation is a crisis of *governance***

**Water resources will continuously diminish as a result of population growth, of pollution and of foreseeable climate change.**

**At global scale, the challenge is to awaken the necessary political will to meet commitments concerning water resources and to avoid dealing with the subject with rhetorical declarations and grandiloquent promises...**





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## Mission of UNESCO

**As a specialized agency of the United Nations, UNESCO contributes to the building of peace, the alleviation of poverty, sustainable development and intercultural dialogue through education, the sciences, culture, communication and information.**

- **Laboratory of ideas**
- **Clearing house**
- **A standard setter**
- **Capacity builder**
- **Catalyst for international cooperation**



**UNESCO contributes to the building of peace, the alleviation of poverty, sustainable development and intercultural dialogue**

**Education**

**Attaining quality Education for all**

**Natural Sciences**

**Mobilizing science Knowledge and policy for sustainable development**

**Social and Human Sciences**

**Addressing emerging ethical challenges**

**Culture**

**Fostering Cultural diversity and intercultural dialogue**

**Communication and Information**

**Building inclusive knowledge Societies through Information and communication**





The dimensions of water

*What is UNESCO doing?*



# UNESCO Actions

- 1. Assessment of the state of water resources in the world...**
- 2. Better knowledge of key hydrological processes and responses to global change...**
- 3. Prevention of conflicts...**
- 4. Capacity – Building (teaching – demo - disseminating)...**





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## UNESCO Actions: Raising AWARENESS...



- How to put water in the minds of people???

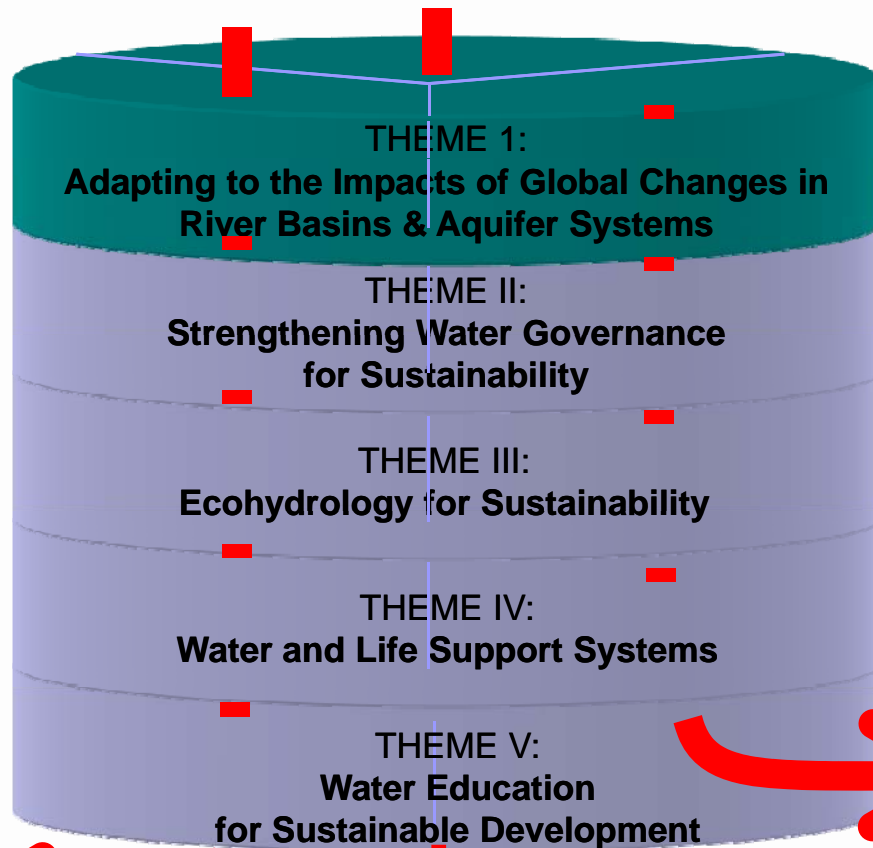




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# UNESCO's action within the frame of the International Hydrological Programme (IHP): Cross-cutting issues for IHP-**V**/II



Key Theme:  
I

New Initiatives:  
II, III, IV, V

Water Resources  
Management

Hydrological  
Research

Education & Capacity Building







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**Assessment of the state of water resources  
in the world**

# **World Water Assessment Programme (WWAP)**





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'...shows that collective responsibility is essential for assessing and monitoring progress and for meeting internationally agreed targets and goals.'

Kofi Annan

# Water

## a shared responsibility

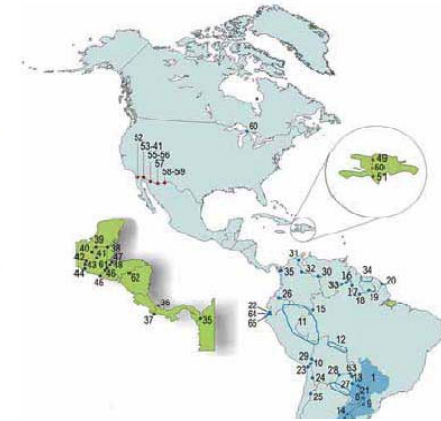


## The United Nations World Water Development Report 2

### 374 · WATER: A SHARED RESPONSIBILITY

The depletion of national water resources, recurring droughts and expanding socio-economic demands have all fuelled confrontations and forced international exchanges and cooperation

Map 11.1: Transboundary aquifers of the Americas (in progress)



SHARING WATER · 391

Insightful works are linking water resources to vulnerability, a function of many factors that include economic and political conditions, water availability, population growth, climate variability and the extent to which a source of water supply is shared. 'Regions at risk' are suggested as a result of basic qualitative calculations. The scarcity of water is replacing that of oil as a flashpoint for conflict between high-risk countries (Brauch et al., 2003; Gleditsch, 1997). On the other hand, shortages can also stimulate cooperative solutions or international intervention for profit management. Extreme hydrological events – droughts or floods, institutional problems and expanding populations – are exacerbating problems in these regions.

Regions can therefore be characterized by three particular vulnerabilities:

- ecological vulnerability: arid regions and regions of limited resources
- economic vulnerability: concerned with past practices of traditional exploitation and state economics

■ social vulnerability: over-utilizing resources, as well as complex social economic and ecological forces affecting an area's natural equilibrium.

Hence the terms 'fragility', 'volatility' and 'carrying capacity'<sup>13</sup> have become indicators of conflict or cooperation in shared water systems.

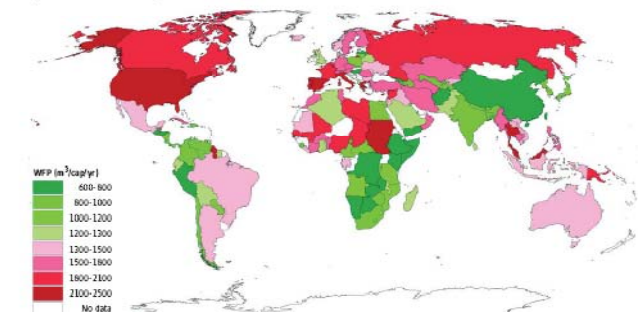
Concern about water privatization and civil unrest, which can also lead to conflict, has increased with the acquisition of national water companies by multinational corporations. The commodification of water has raised questions about poverty alleviation, water markets' effect on local economies and the search for a water democracy (see Chapter 12). Human rights issues, visionary declarations and the continuity of water equity all raise questions of fairness, distributive justice and the responsibilities of international communities vis-à-vis water sharing.<sup>14</sup>

Finally, the role of virtual water needs further attention as well. A broad indicator – a water footprint – links virtual water and world trade; via the sum of domestic water use and virtual water, we can then consider how

<sup>13</sup> Carrying capacity is the measure of an environment's ability to sustain itself and its ecosystem.

<sup>14</sup> *Water and Water*, a series of short volumes compiled by UNESCO, raises fundamental questions about our ethical and moral duties in sharing non-renewable groundwater resources and creating cooperative mechanisms. Available online at [www.unesco.org/eng/edpublications/GovernList.html](http://www.unesco.org/eng/edpublications/GovernList.html). See also Croppier, 2000.

Map 11.2: National water footprints around the world, 2004



Note: Average national water footprint per capita (m³/cap/yr). Green means that the nation's water footprint is equal to or smaller than global average. Countries with red have a water footprint beyond the global average.

Source: Chapagain and Hoekstra, 2004.





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# ISARM: Aquifer Resource Management

Links Dictionary Google Address <http://www.isarm.net/>







**Welcome to**



**what is a transboundary aquifer?**

**how widespread are transboundary aquifers?**

**read the ISARM news**

**ISARM**  
**International Shared Aquifer Resource Management**

**a global initiative for identification, assessment and sound management of transboundary aquifers**

- i Initiative**
- Programme**
- Regional Activities**
- People**
- Documents**
- Collaborative Environment**

ISARM contact



# Groundwater Data Base

**igrac** Global Groundwater Information System

Zoom to: Choose transboundary aquifer ... **Only Southern Africa! attribute**

**Legend**

**Dominant lithology (sand and gravel/sandstone/carbonate rock/carbonate rock and sandstone/volcanic rock/intrusive and metamorphic)**

- Sand and gravel
- sandstone
- carbonate rock
- volcanic rock
- intrusive or metamorphic rock
- No information available

**Transboundary aquifers**

- Aquifer
- Other

Map of Southern Africa showing various basins and aquifers. Labels include: Coastal Sedimentary Basin 2, Congo Intra-crustal Basin, Coastal Sedimentary Basin 3, Nata Fynbos Sub-basin, Cuvelland Etoosha Basin, N. Kalahari/Karoo Basin, Tuli Karoo Sub-basin, Limpopo Basin, SE Kalahari/Karoo Basin, Ranyana Granite Basin, Rhyolite-Etoshia Aquifer, Coastal Sedimentary Basin 5, Karoo Sedimentary Aquifer, Karoo Aquifer, and Kilimanjaro Coastal.

Map: 2432938.08 , 409577.63 Window: 301 , 3

Copyright(C) 2004 IGRAC

Query - Microsoft Internet Explorer

Query by transboundary aquifer

**Attribute**

- Dominant lithology
- Estimated volume is storage
- Extent of arid land (P/ET<0.2) as a % of total land
- Extent of humid land (P/ET>0.65) as a % of total land
- Foreseen total water demand in next 10 years
- Frequency of water-level monitoring

= > >= And Not Between  
<> < <= Or () In()

**Unique values**

- 'Sand and gravel'
- 'carbonate rock'
- 'sandstone'
- 'volcanic rock'

Retrieve

**Query**

Dominant lithology = 'Sand and gravel'

Clear Check Ok Close





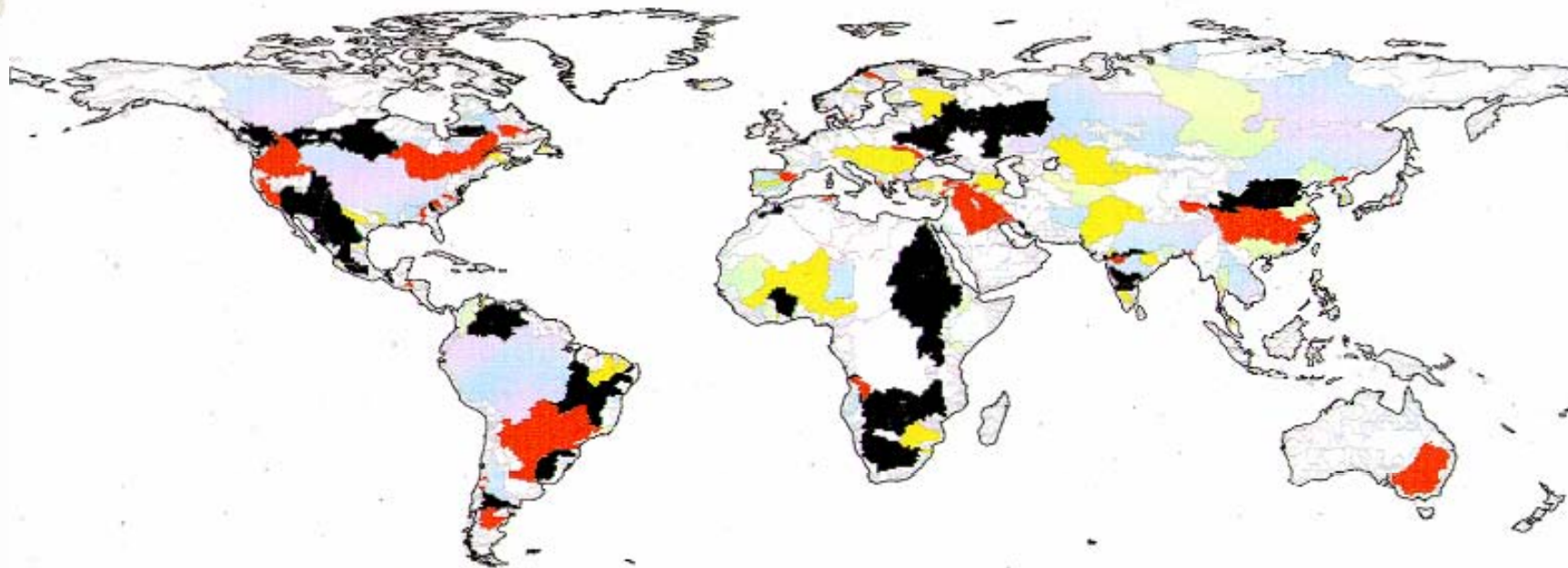
# INWEB: Transboundary Ground Water in SEE



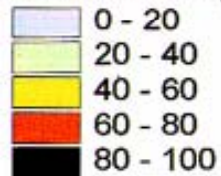


# Better knowledge of key eco - hydrological processes and responses to global change

## Basinwide Sediment Trapping Efficiency



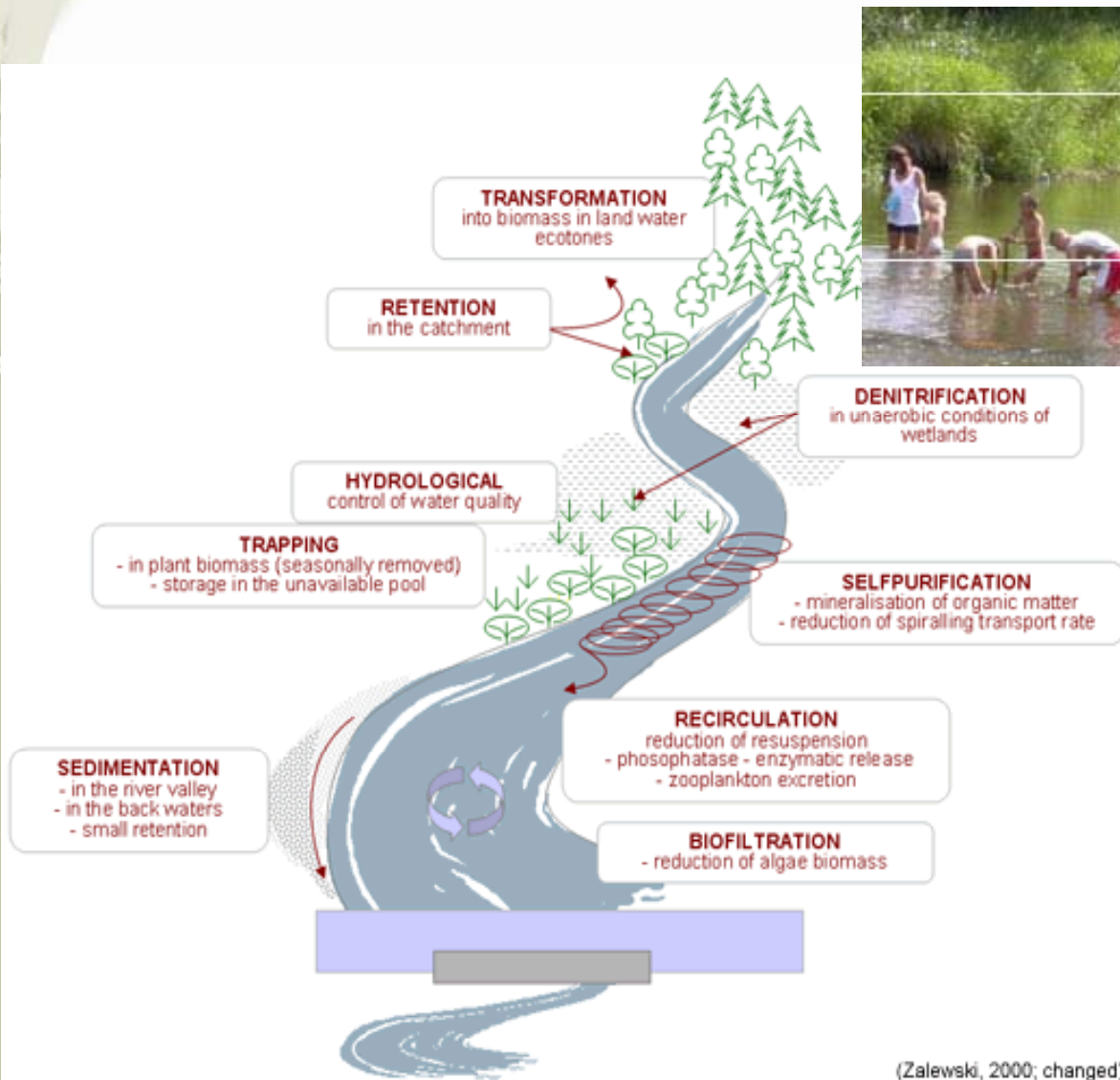
Basinwide Trapping Efficiency (%)







# Eco - hydrological processes and responses of Watersheds





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# From **Potential Conflict** to **Co-operation Potential**



## **Water for Peace**

a contribution to

# **World Water Assessment Programme**

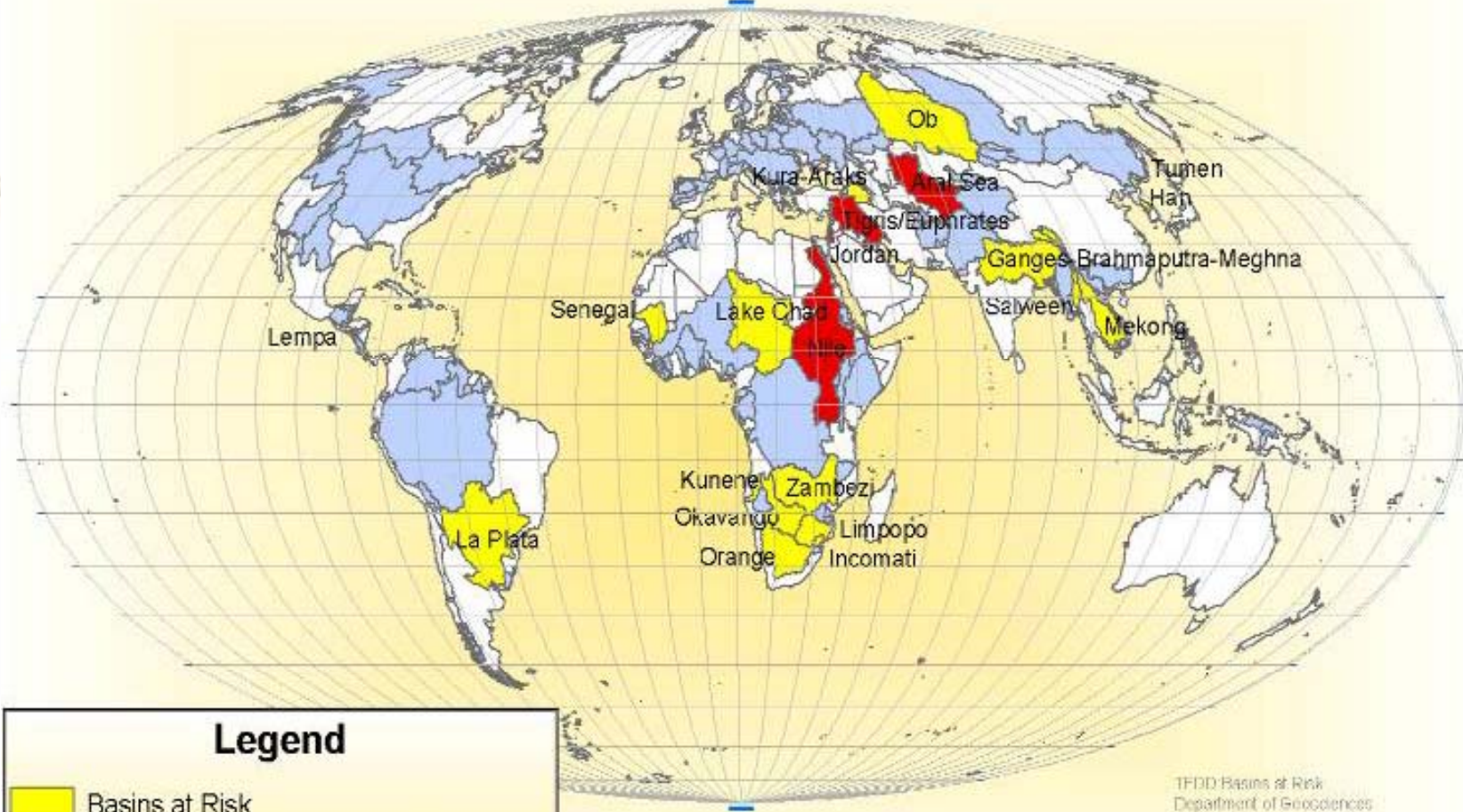






# Prevention of conflicts

## Basins at Risk



### Legend

- Basins at Risk
- Political Boundaries
- International Basins
- Basins Currently in Dispute/Negotiations



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**HELP**

**Hydrology for the  
Environment, Life and  
Policy**

[HTTP://WWW.UNESCO.ORG/WATER/IHP/HELP](http://www.unesco.org/water/ihp/help)

**The HELP initiative is establishing a global network of catchments to improve the links between hydrology and the needs of society.**

The HELP catchments provide a framework for scientists, managers and policy-experts to come together to address locally defined water related issues. These include:

- Water and food
- Water and climate
- Water and conflict
- Water quality and human health
- Water and the environment

**Real people**

**Real catchments**

**Real answers**

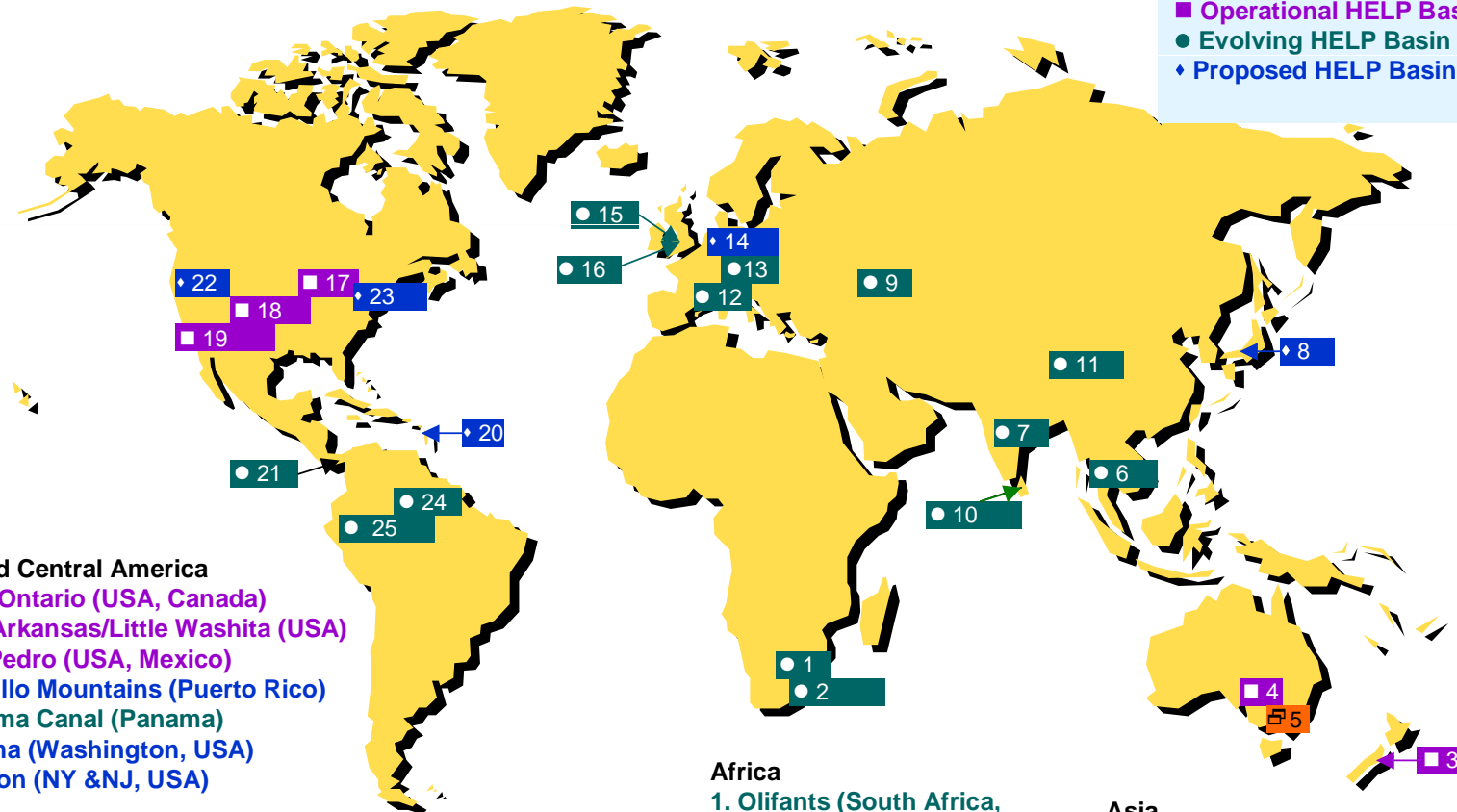






# HELP PILOT PHASE DRAINAGE BASINS

- Reference HELP Basin
- Operational HELP Basin
- Evolving HELP Basin
- Proposed HELP Basin



### North and Central America

- 17. Lake Ontario (USA, Canada)
- 18. Red-Arkansas/Little Washita (USA)
- 19. San Pedro (USA, Mexico)
- 20. Luquillo Mountains (Puerto Rico)
- 21. Panama Canal (Panama)
- 22. Yakima (Washington, USA)
- 23. Hudson (NY & NJ, USA)

### South America

- 24. Rio Jau and/or Rio Branco or Ji-parana (Brazil)
- 25. Rio Jequetepique (Peru)

### Europe

- 12. Herault ( France)
- 13. Danube (5 countries in Europe)
- 14. Spree-Havel (Germany)
- 15. Upper Severn (UK)
- 16. Thames (UK)

Middle East (None)

### Africa

- 1. Olifants (South Africa, Mozambique)
- 2. Thukela (South Africa)

### Australasia

- 3. Motueka (New Zealand)
- 4. Mount Lofty (Australia)
- 5. Murrumbidgee, sub-basin of Murray Darling (Australia)

### Asia

- 6. NE of Thailand and Vietnamese Delta, sub-basins of Mekong (6 countries in Asia)
- 7. Subernarekha (India)
- 8. Yasu or Tama (Japan)
- 9. Aral Sea (Central Asia)
- 10. Walawe (Sri Lanka)
- 11. Tarim (China)





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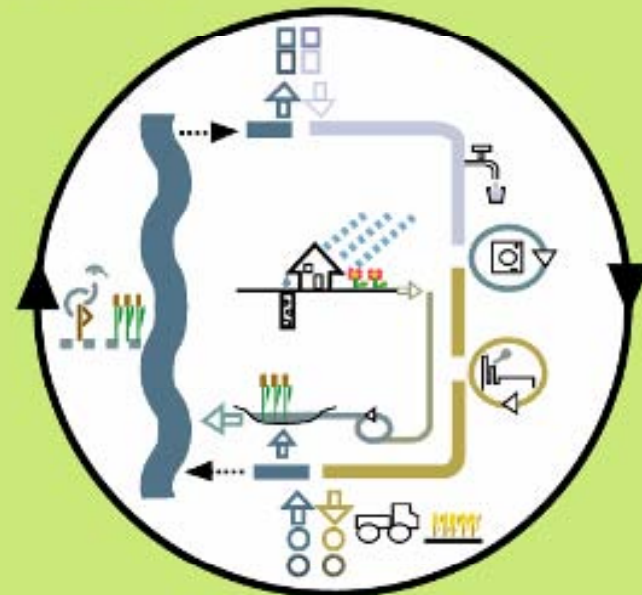
# Urban Water Management



## Frontiers in urban water management

### Deadlock or hope?

Čedo Maksimović  
José Alberto Tejada-Guibert (Eds.)







### 1. Data requirements management for integrated urban water management

Reliability and availability of data is a prerequisite for quality urban water analysis of performance planning of rehabilitation and management. The project will result in a consistent methodology for data gathering, processing, and quantification of uncertainty and application under specific climate conditions.

### 2. Processes and interactions in the urban water cycle



Improved understanding of processes that take place in urban environment, and of the interactions of natural suburban, rural and urban environments for the successful analysis, planning, development and management of urban water systems

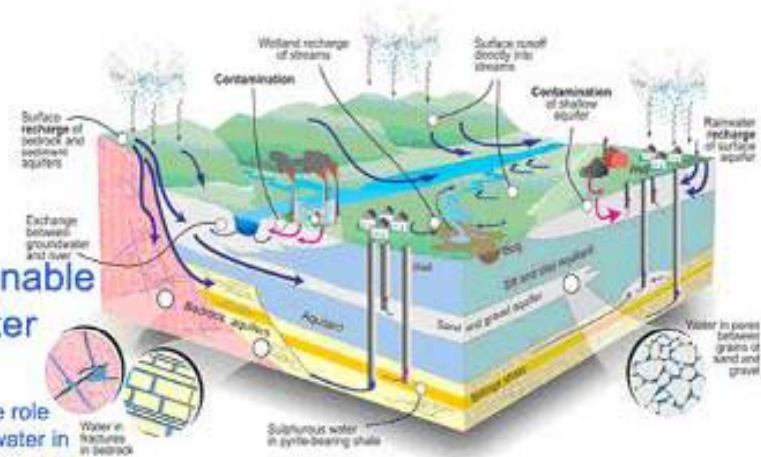
### 4. Integrated urban water system interactions:



Expanded knowledge base related to the interactions of man-made systems in the urban environment and development of applicable tools and approaches for analysis

### 3. Towards sustainable urban groundwater management

Enhanced understanding of the role and the interactions of groundwater in the urban environment for sustainable integrated strategies





Strengthening the analytical framework for integrated urban water management under specific climates, with special focus on developing countries

5. Integrated urban water modelling and management under specific climates: humid tropics (HT), arid and semiarid climates (ASA), cold climates (CC) and temperate climates (TC)



6. Urban water security, human health and disaster prevention

Provide criteria and problem solving approaches to enhance water related security in the urban environment under present day and future emerging threats

8. Socio-economic and institutional aspects in urban water management



Expand capabilities of urban water decision-makers, planners and managers by advising appropriate strategies for urban water management taking into account social and institutional aspects.

7. Urban aquatic habitats in integrated urban water management



Improved knowledge and methodological base for the integration of urban aquatic habitats and water based amenities into urban water development and management strategies. Testing of methodologies in selected case studies.





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## Delft: UNESCO Institute for Water Education





## UNESCO Institutions

### **CATEGORY 1- legally part of UNESCO:**

- UNESCO-IHE Institute for Water Education (Delft, The Netherlands) - 2003

### **CATEGORY 2 – under the auspices of UNESCO:**

- IRTCES - International Research & Training Center on Erosion & Sedimentation (Beijing, China) - 1985
- IRTCUD – International Research & Training Center on Urban Drainage (Belgrade, Serbia & Montenegro) -1988
- CATHALAC – Centro del Agua para los Trópicos Húmedos de LAC (Panama City, Panama) - 1992
- Humid Tropics Hydrology Center for South East Asia & the Pacific (Kuala Lumpur, Malasia) - 1998





## **CATEGORY 2 (cont.):**

- RCTWS – Regional Center for Training and Water Studies in Arid & Semiarid Zones (Cairo, Egypt) - 2001
- RCUWM – Regional Center on Urban Water Management (Teheran, Iran) - 2002
- ICQHHS – International Center on Qanats and Historic Hydraulic Structures (Yazd, I.R. of Iran) -2005
- CAZALAC - Centro del Agua para Zonas Áridas y Semiáridas de LAC - (La Serena, Chile) – (2006)
- International Center for Water-Related Risks and Hazards – ICHARM (Tsukuba, Japan) – (2006)
- Regional Ecohydrology Center – Europe (Lodz, Poland) – (2006)
- IHP-HELP Centre for Water Law, Policy and Science (U Dundee, UK) – (2006)

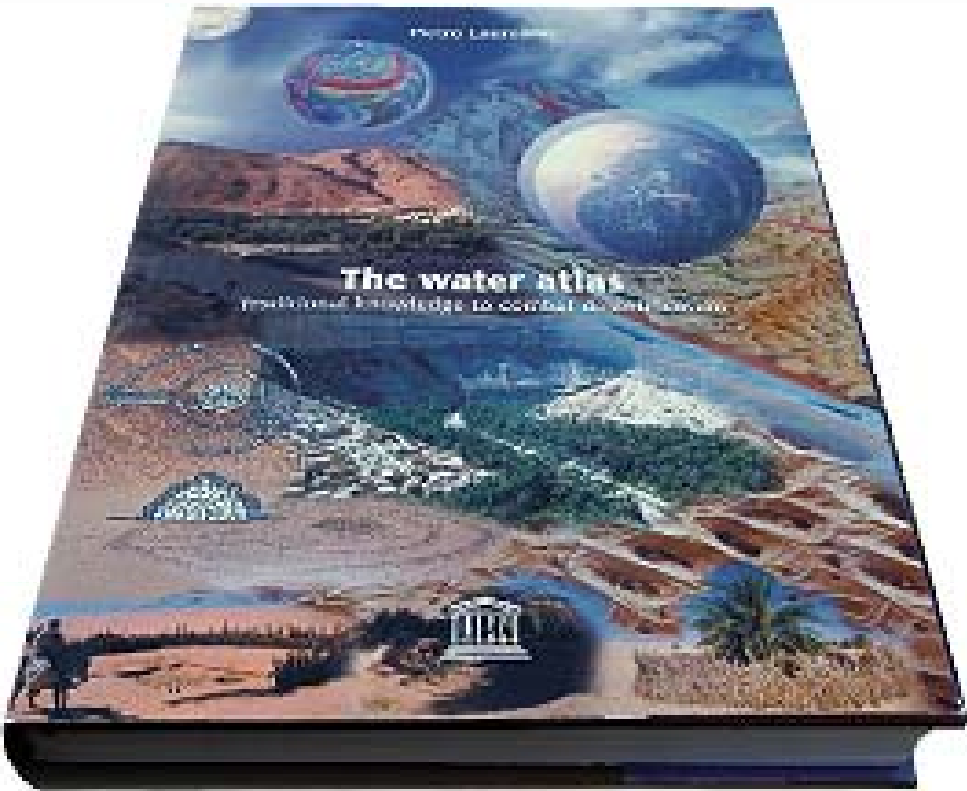


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tkwb



member area  
login:  
password:



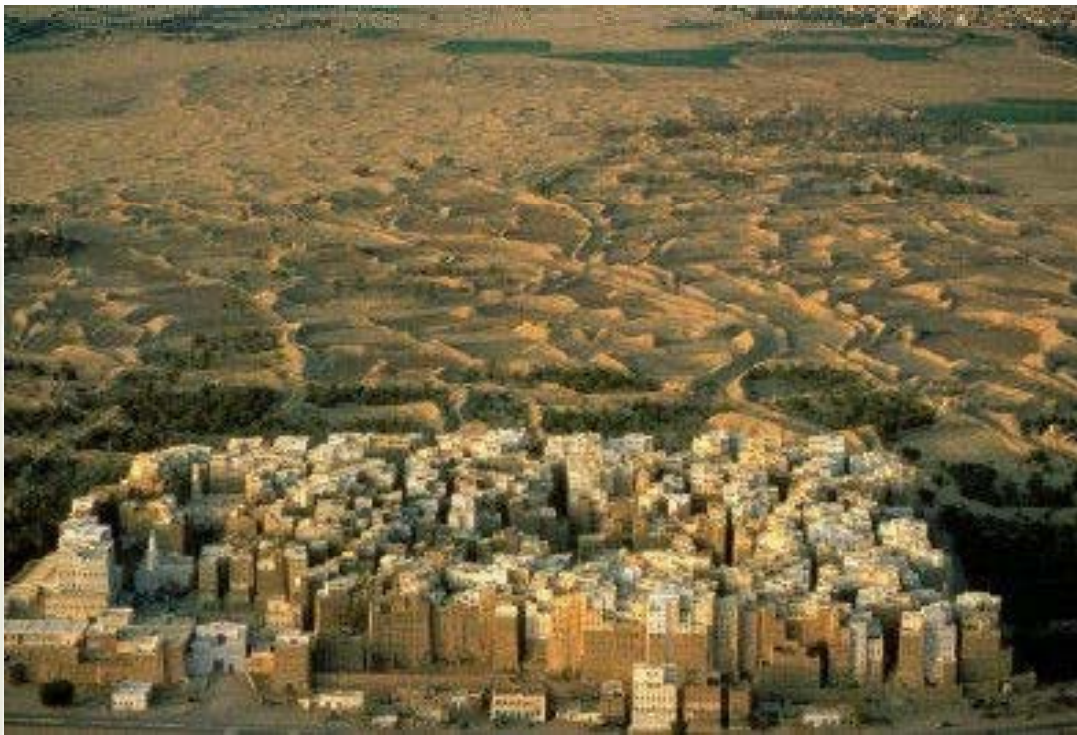


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**To fight against desertification implies taking care of landscape management (agriculture, re-forestation, fires control...), but also to maintain and promote traditional knowledge and sustainable human settlements:**

- Traditional systems for soil conservation;**
- Traditional knowledge for saving water resources and energy;**
- Integrated cycles of production.**







## C WATER MANAGEMENT

## B AGRICULTURE

## A SILVICULTURE, BREEDING, HUNTING AND HARVESTING

## E SETTLEMENTS, ARCHITECTURE AND MOVABLE HANDIWORKS

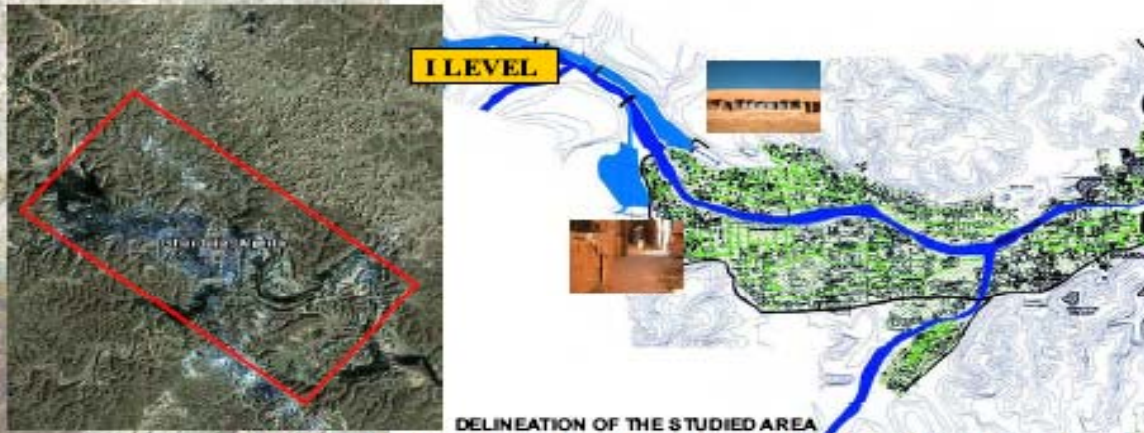






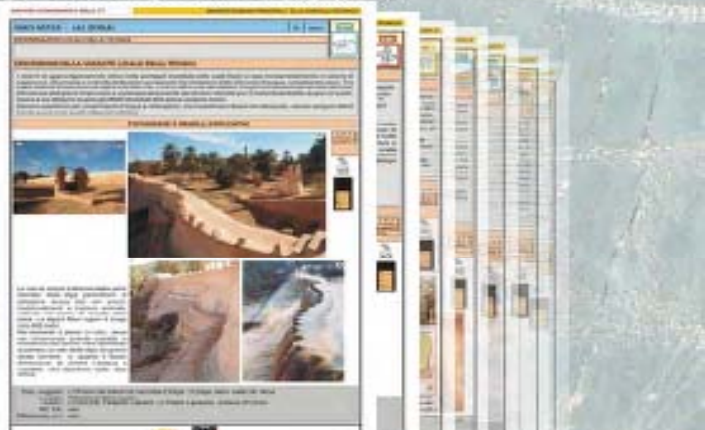
**3.3 STUDY OF SPECIFIC AREAS USING THE ICONOGRAPHIC SYSTEM**

EXEMPLES OF CASE-STUDIES CARRIED OUT : *WADI MZAB (ALGERIA)*



- SYMBOLY USED FOR ASSESSING THE CURRENT STATE**
- UNALTERED EFFICIENT
  - PROTECTED AND WORKING
  - PROTECTED AND MODIFIED
  - ALTERED
  - AT HIGH RISK OF ABANDONMENT OR DISAPPEARANCE
  - ABANDONED OR REPLACED

**NOTIFICATION OF EXISTING TECHNIQUES**





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## Aqua alta



□ After the devastating floods of November 1966, UNESCO launched its international Campaign





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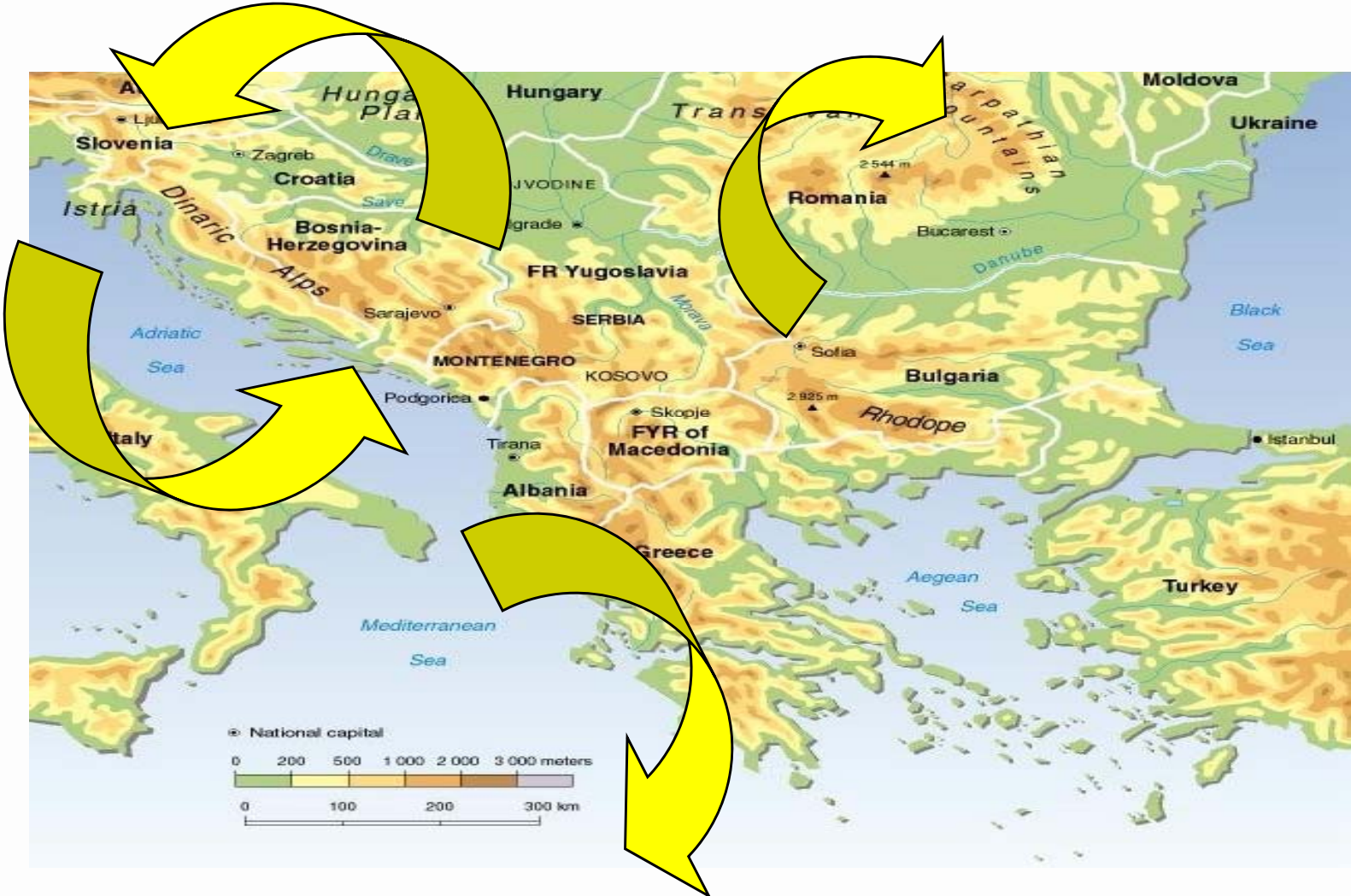
## **Targets of the UNESCO - BRESCE**

**Contribute to peace, stability and sustainable development in Europe, especially in SEE and the Mediterranean area, through activities in the field of Science and Culture, considering the political, social and environmental changes, by providing policy advice, capacity building, communication and supporting territorial management as well as risk and conflict prevention.**



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# UNESCO'S ACTIVITIES IN SEE



**IHP - Water Dependencies : Systems under Stress and Societal Responses (7th phase 2001-2007)**



**MAB - Environmental Protection and Sustainable Development - Focus on Local Territorial Systems**







- ✓ **Regional cooperation of the Danube countries (Water and Sediment Balances delivered to ICPDR);**
- ✓ **Ecohydrology (deltas and estuaries);**
- ✓ **Internationally shared water systems – Focus on Karst (TRANSKARSTBA with INWEB; DiKTAS);**
- ✓ **Water Governance (building up of policy options with DSS – WaterStrategyMan);**
- ✓ **River corridors (Sava, Drin, Drava-Mura) and Lakes (Ohrid-Prespa, Skadar) as Transboundary Systems for cooperation in the promotion of Sustainable Development model regions (Biosphere Reserves).**





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# Venezia e la sua Laguna

- **A common vision**
- **Sustainable development**
- **Participatory process**
- **Knowledge Transfer**
- **Decision making processes**





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**Model  
Regions/  
Laboratories  
MAB/WHC**

**Impact**

**Resource use**

**Global economy**

**Climate change**

**Conflicts**

**Sustainable growth**

**Participation**

**New Leadership**

**Quality economy**

**Innovation**

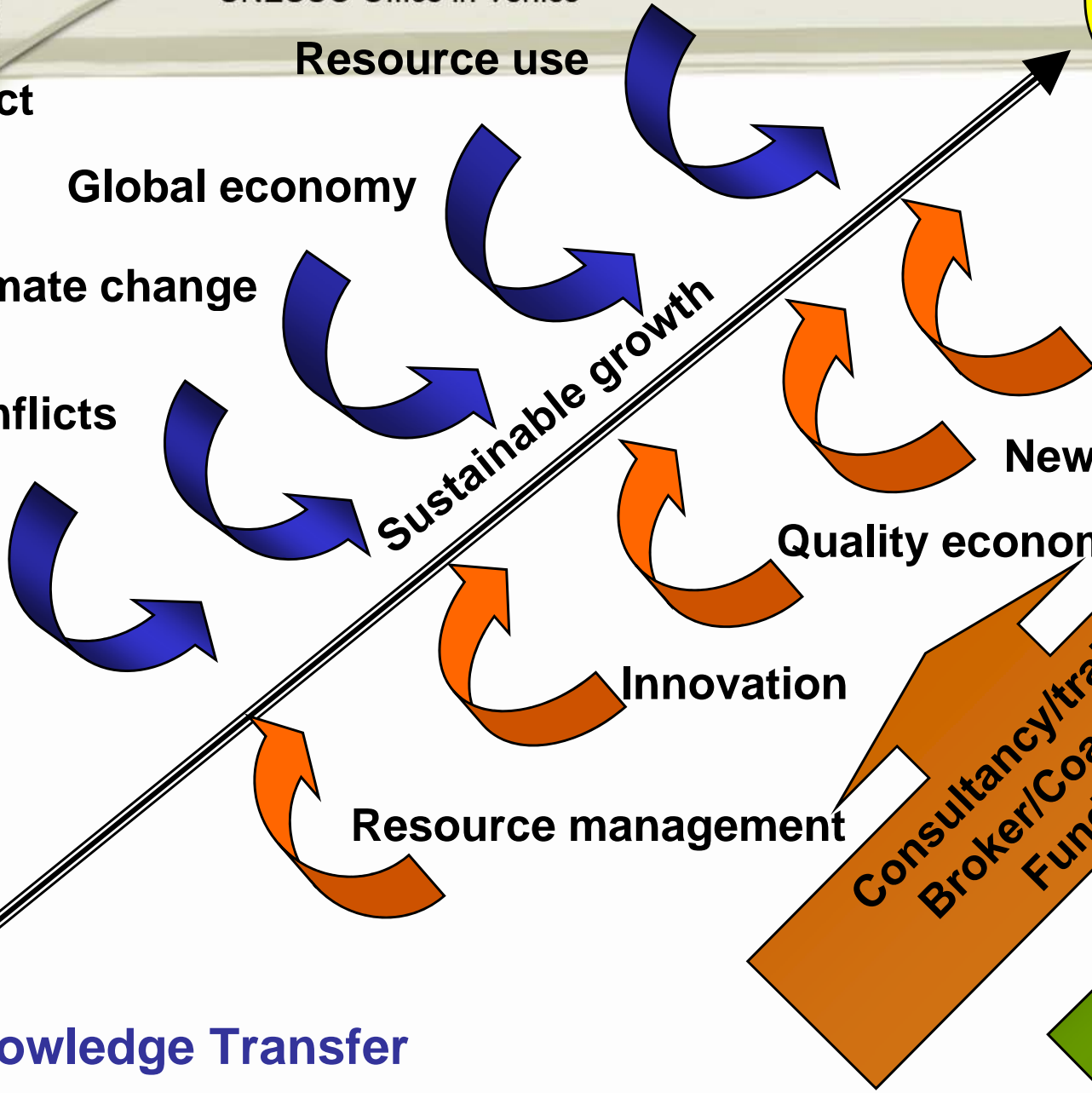
**Resource management**

**Consultancy/training  
Broker/Coaching  
Funding**

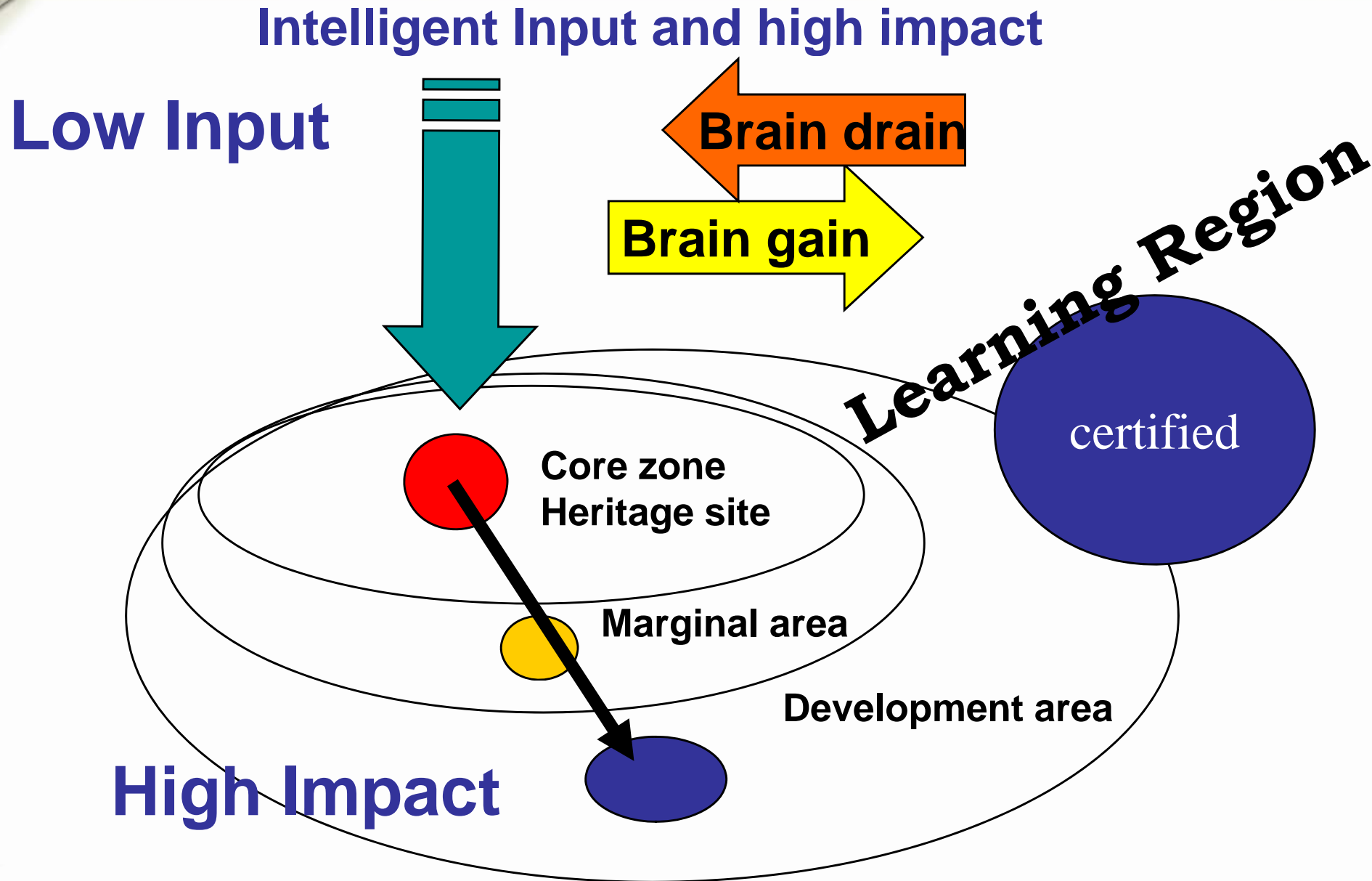
**Research  
Knowledge**

**Knowledge Transfer**

**time**

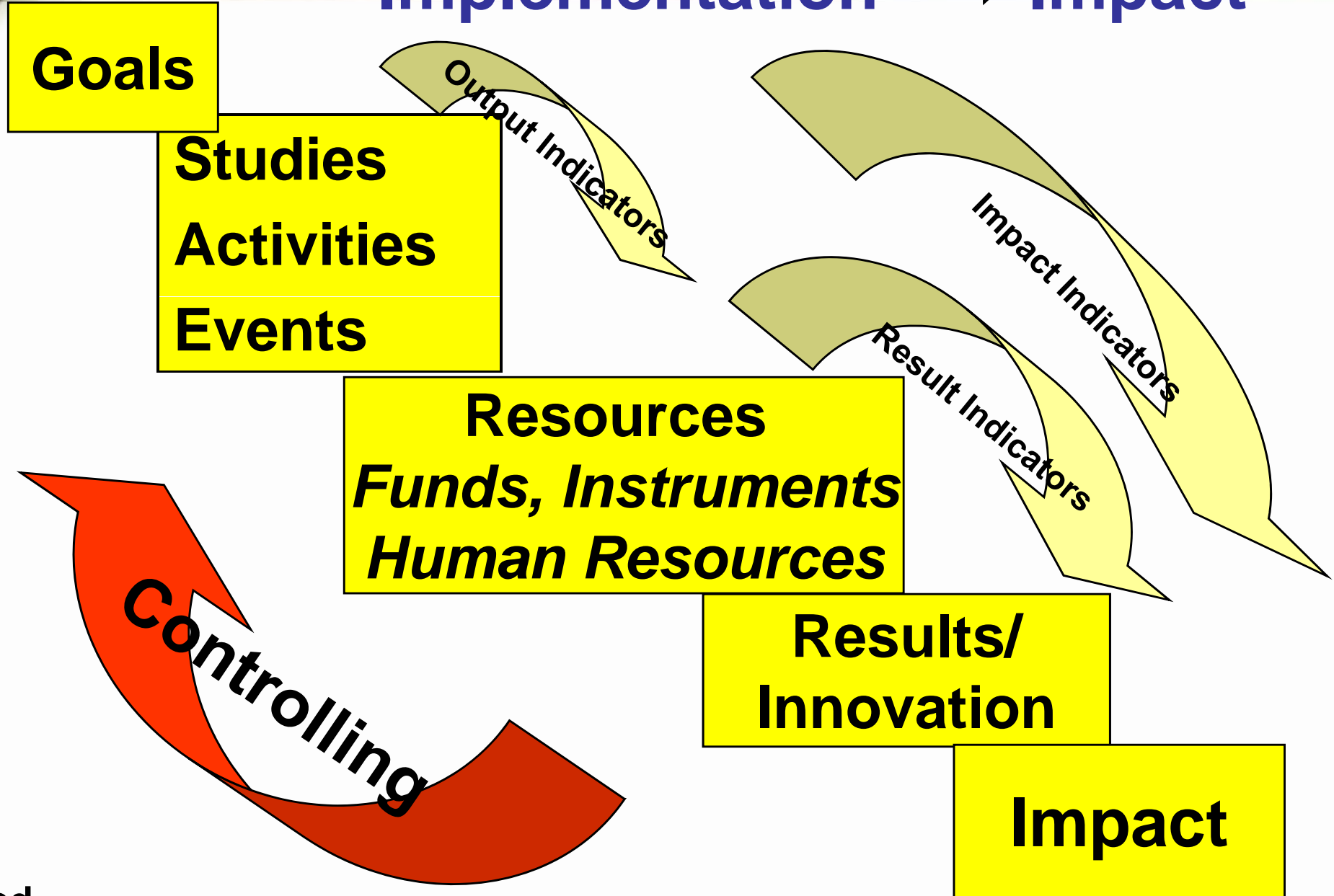








# Implementation → Impact



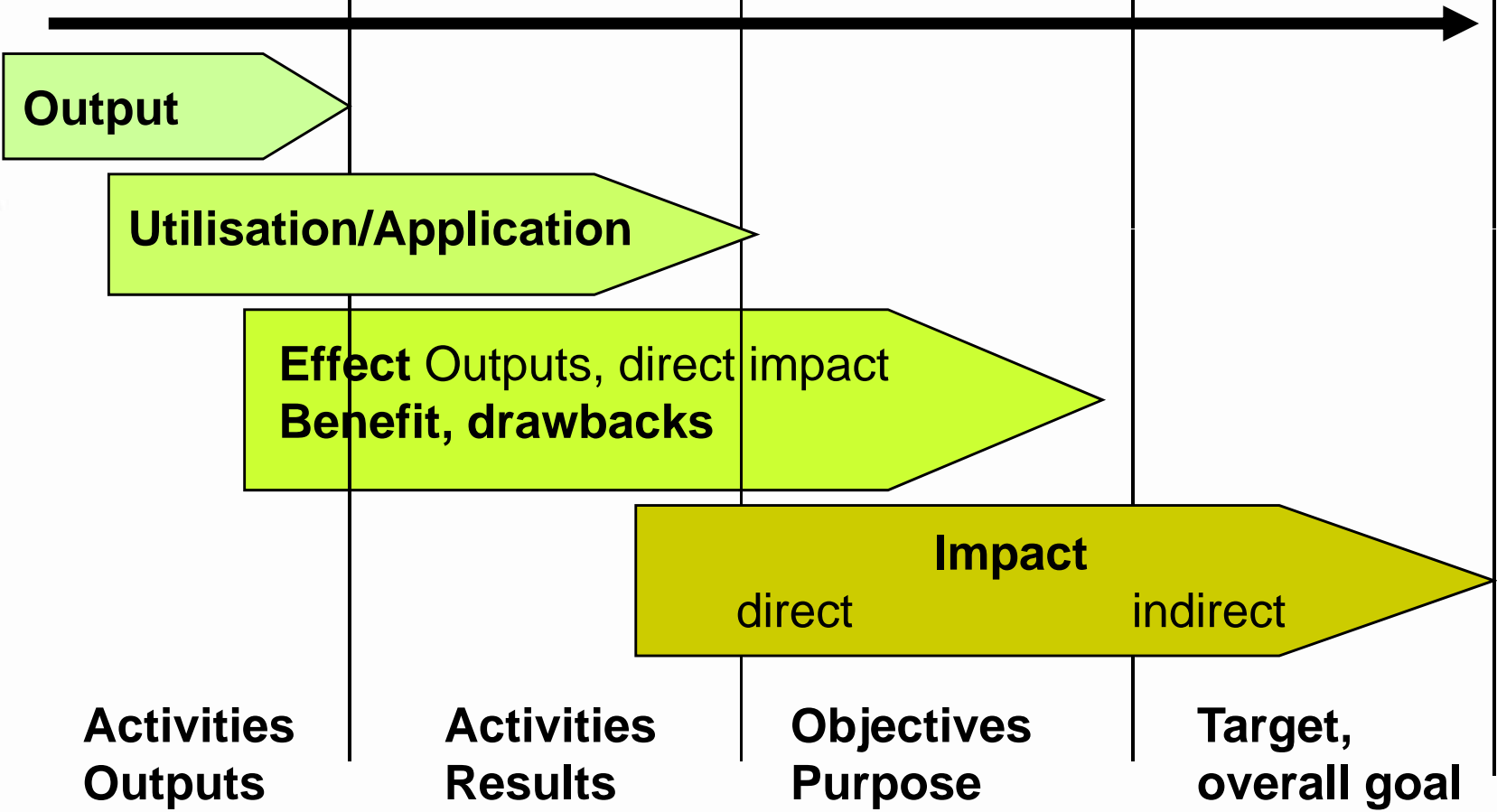




**Vision**

# Impact chain

## Goal concretisation



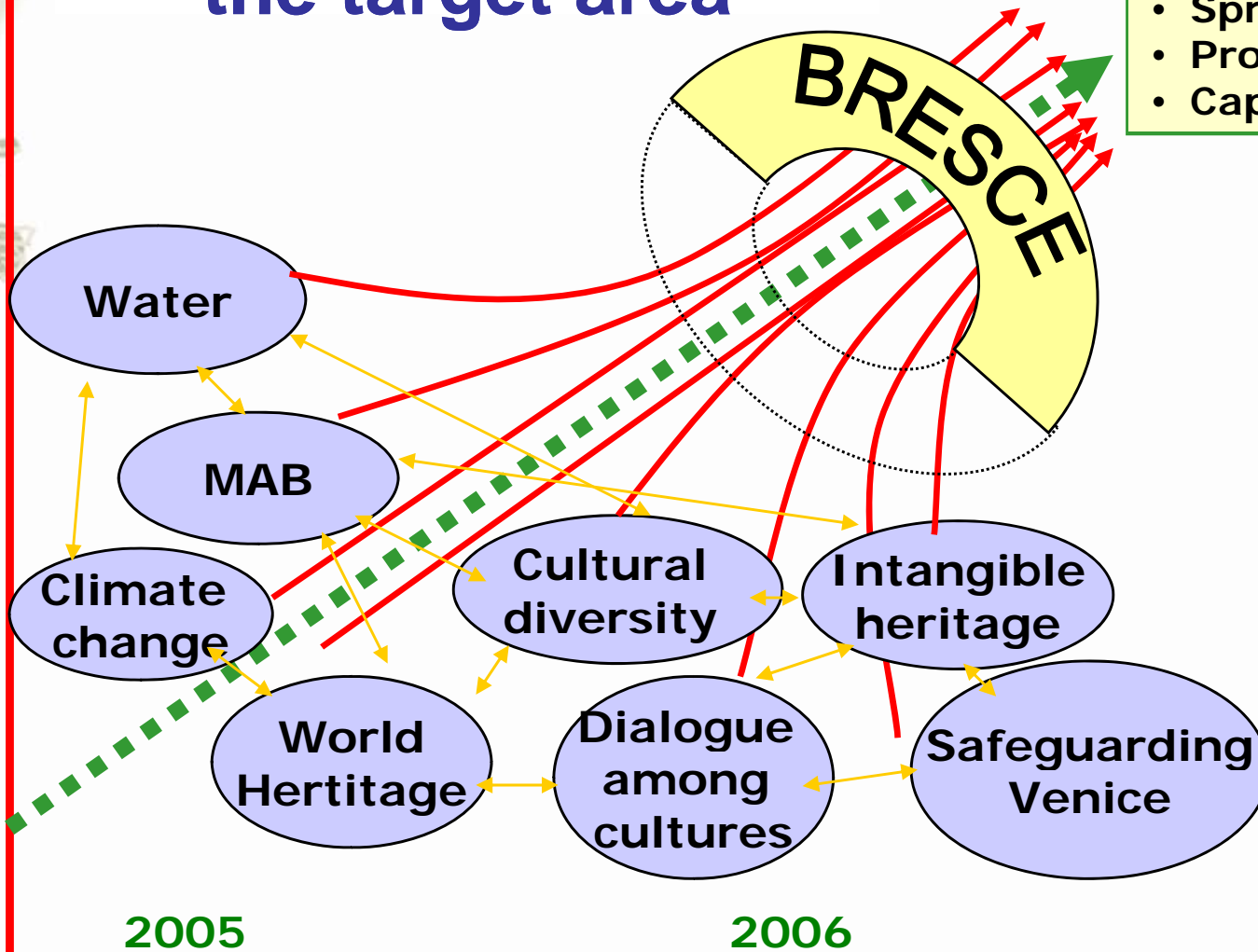
## Project achievements



# Increase impact in the target area

- Sustainable development
- Benefit of locals
- Involving member states
- Cooperation
- Spreading of innovation
- Promoting cultural diversity
- Capacity building

Deliver as one!







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**To know more about our  
initiatives...**

**[www.unesco.org/venice](http://www.unesco.org/venice)**



**Thanks for your attention**

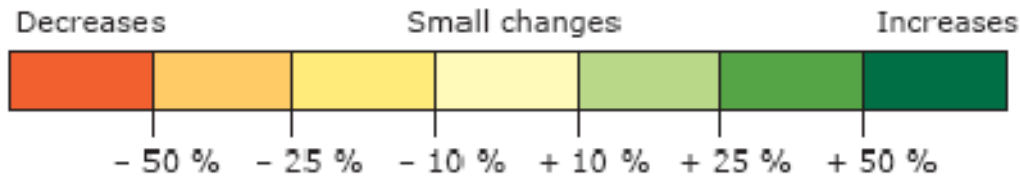
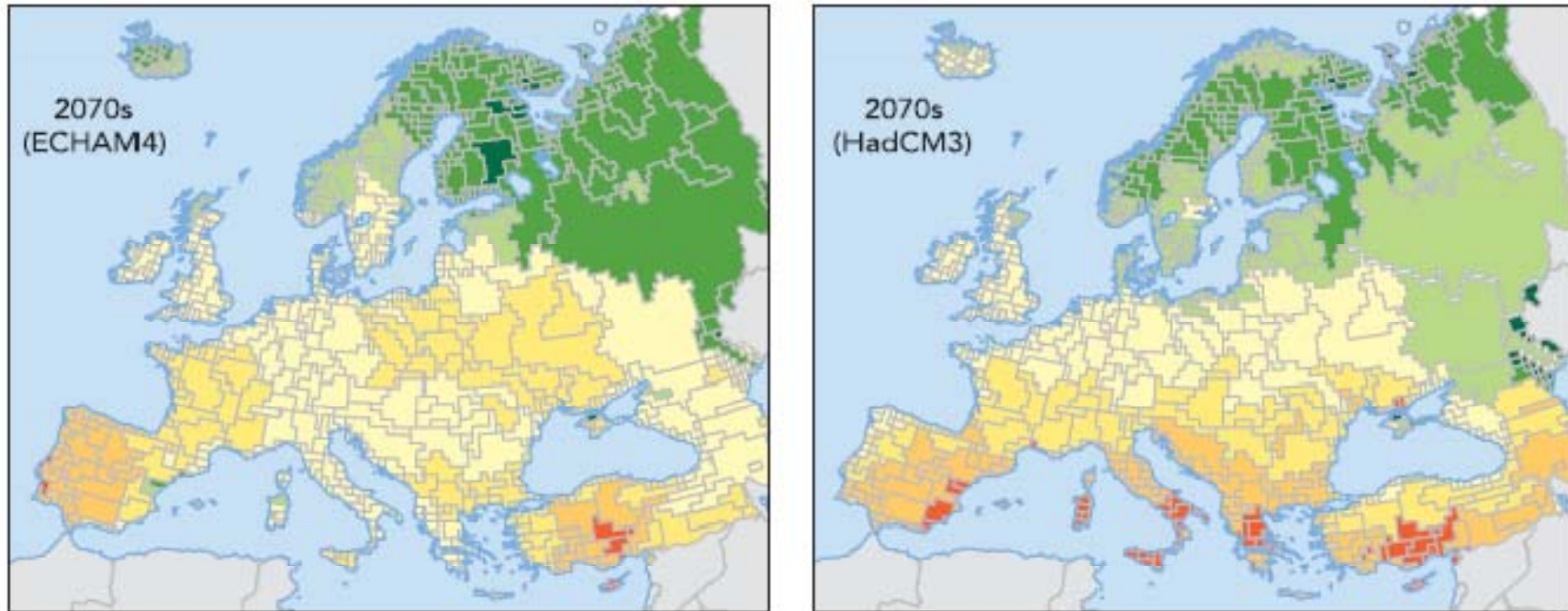


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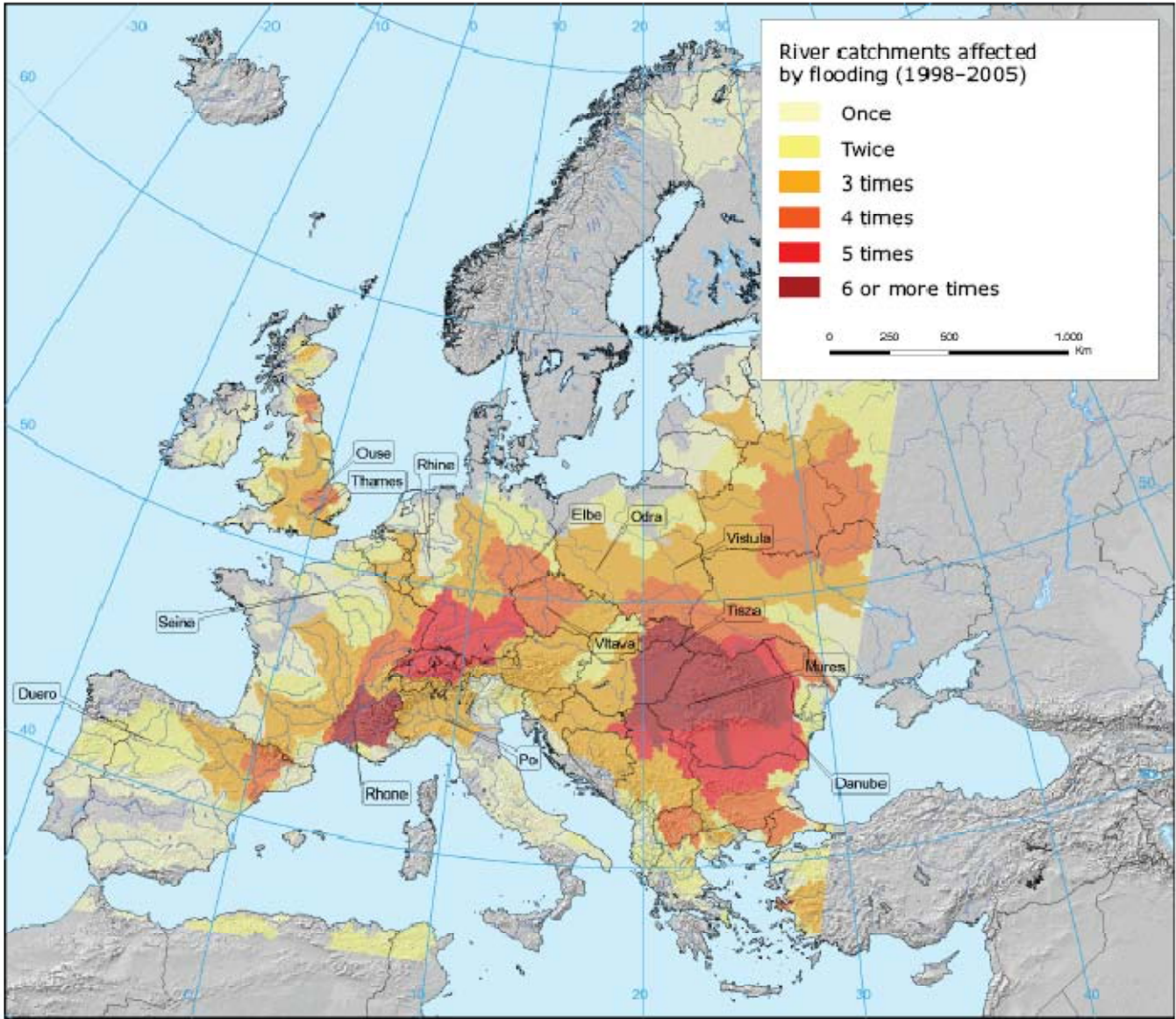
**Figure 1.1 Change in average annual river run-off in Europe 2070 versus 2000**



**Note:** Note that larger changes in seasonal averages are expected in some regions.

**Source:** Lehner *et al.*, 2001; EEA, 2004.

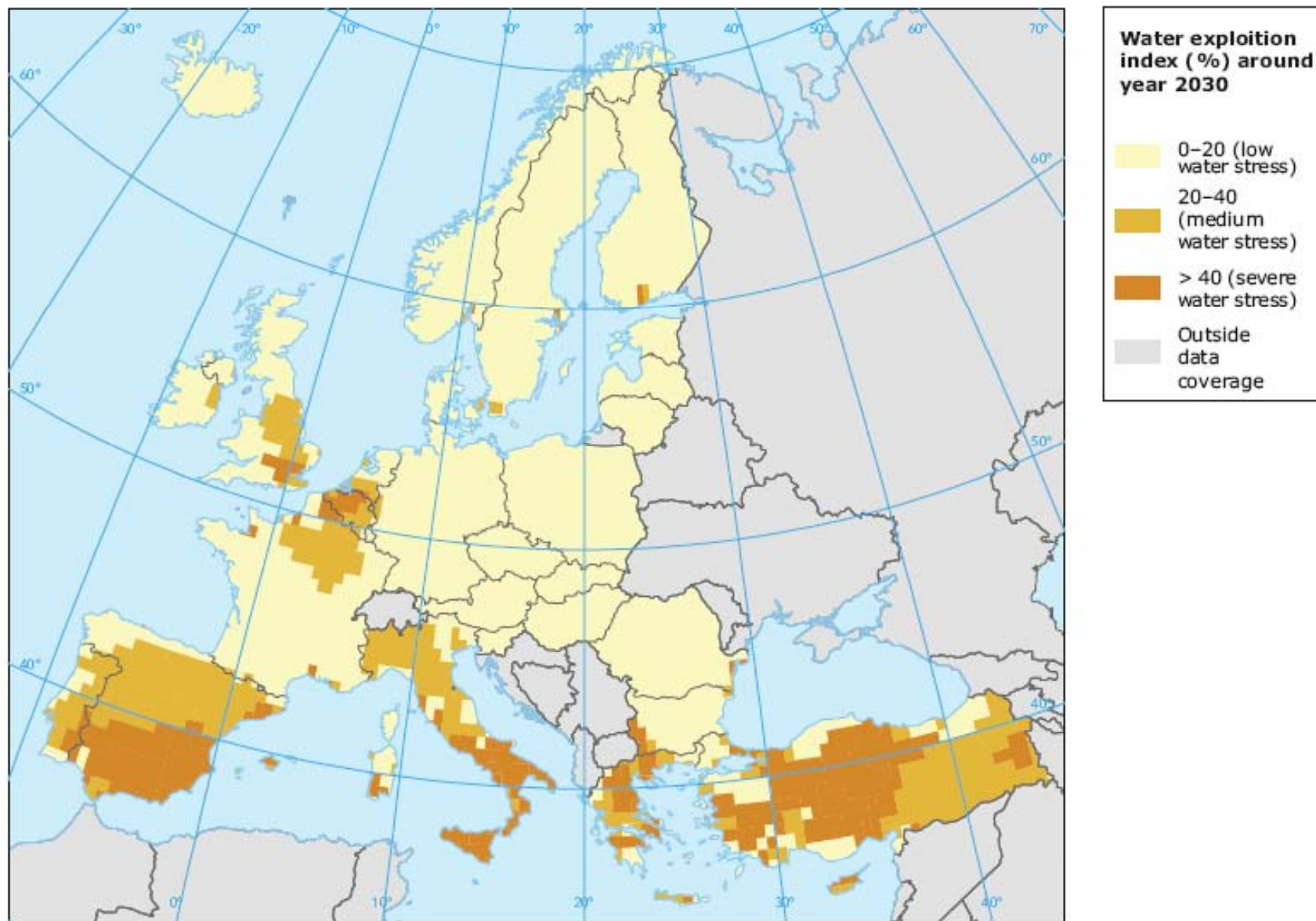
**Figure 1.3 Recurrence of flood events in Europe between 1998 and 2005**



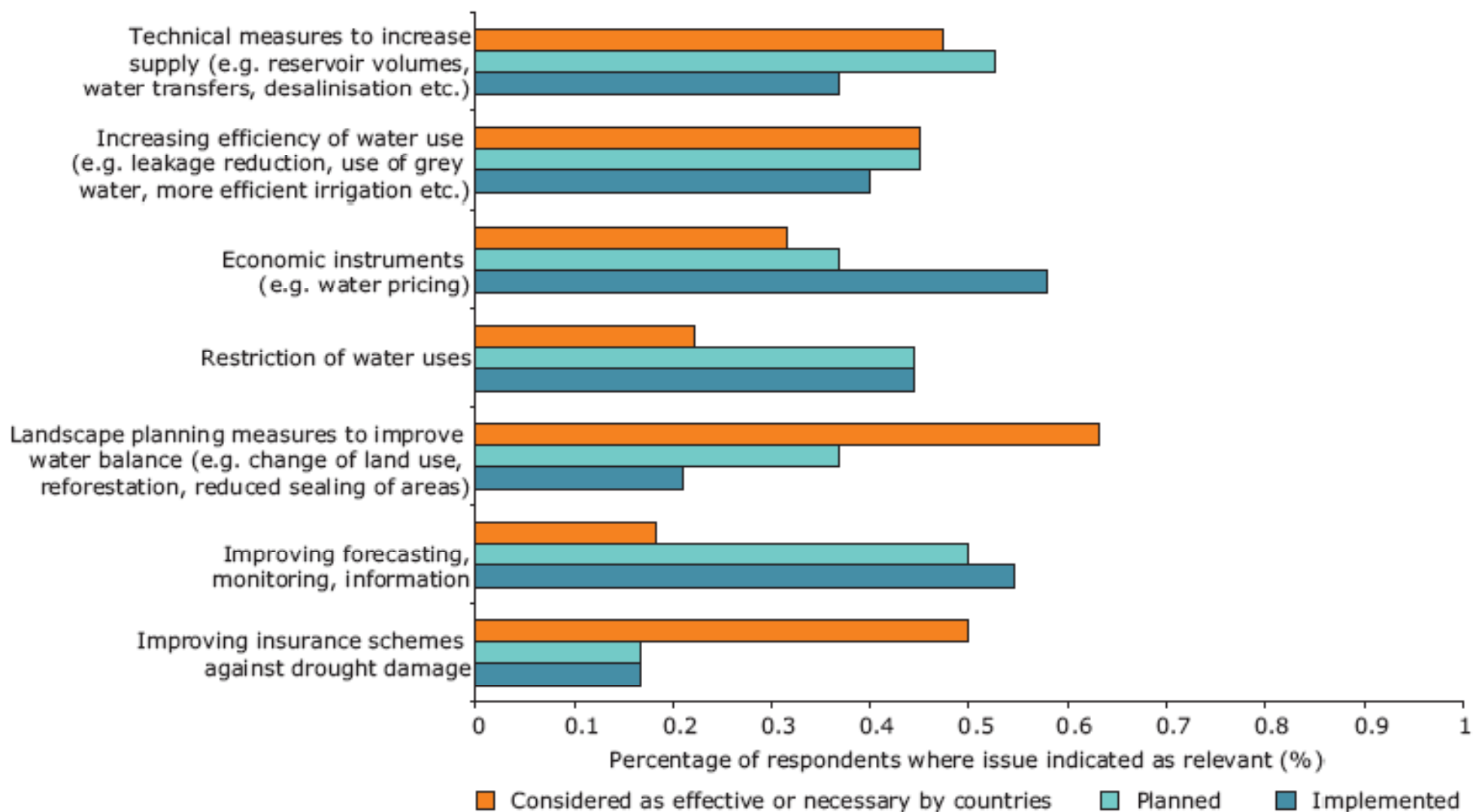
Source: EEA, based on data from Dartmouth Flood Observatory.



**Figure 1.4 Water stress in European river basins under a base-line scenario by 2030**



**Figure 3.1 Implementation and future planning for drought control and water scarcity measures**



Source: EEA and German Ministry survey.