Involvement of IAHS Commissions

- ICSW Yan Huang
- ICGW
- ICSIH Report from John Pomeroy
- ICWQ Berit Arheimer
- ICCE Xinbao Zhang / Vladimir Belyaev
- ICCLAS Stewart Franks / Dawen Yang
- ICWRS Zongxue Xu
- ICRS
- ICT Zhonghe Pang
- ICSH Salvatore Grimaldi

Major challenges for the next IAHS Decade

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President International Association of Hydrological Sciences

Nanjing Workshop
11-12 May 2012

Objectives of IAHS

- To promote the study of ***Hydrology as an aspect of earth sciences and of water resources***
- To study the hydrological cycle…..
- To examine the ***hydrological aspects of the use and management of water resources***….
- To provide a firm ***scientific basis for the optimal utilization of water resource systems***…

Focus on both hydrology and water resources

What should be our focus?

- Clearly we do have to understand all elements of the hydrological system including the important influences that human activities have on the system
- But we also have to examine water as a resource and the management of the resource
- Therefore I choose to approach the subject from the perspective of human needs

Elements of water security

Diverse *uses* of water

- Human well-being – health, food security
- Economic development (energy, industry)
- Social development
- Water to sustain ecosystems

Water as a *threat*

- Floods
- Droughts
- Pollution

Basic Human Well-being – water for health and food security

Need to understand water availability, reliability, quality in surface and groundwaters

Effects of dams:

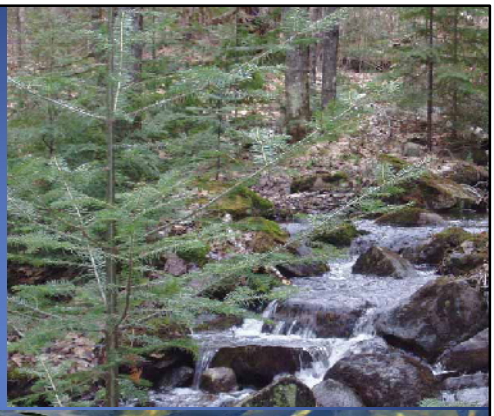
- Short-term decrease in flow as lake fills
- Changes to flow regimes
- Lakes as sediment traps
- Increased evaporation from lake
- Impacts on flora and fauna

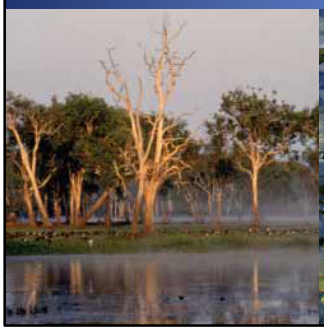
Ataturk dam, Euphrates River, Turkey

Water for ecosystems

Disruption of natural ecosystems:

- Changes in flow regimes
- Changes in sediment delivery
- Effects of pollutants





Floods and Droughts

Floods:

- Typology of floods – multiple origins
- Location, Timing, Intensity, Duration

Droughts:

- Location, Timing, Intensity, Duration

Measures for mitigation and alleviation

Change and Uncertainty *within* Hydrology

- Changes to climatic drivers
  - Changes in energy inputs – global warming
  - Changes in precipitation inputs
  - Uncertainty in solar activity – sunspot variations
  - Uncertainty in volcanic eruptions
  - Particular importance for snow- and ice-dominated regions in high latitudes and altitudes
- Changes due to human activities
  - Dams and diversions affecting flow regimes
  - Changes in land cover influencing runoff characteristics

Such changes and uncertainties lead to challenges in making predictions

Global Precipitation changes 1990 - 2090

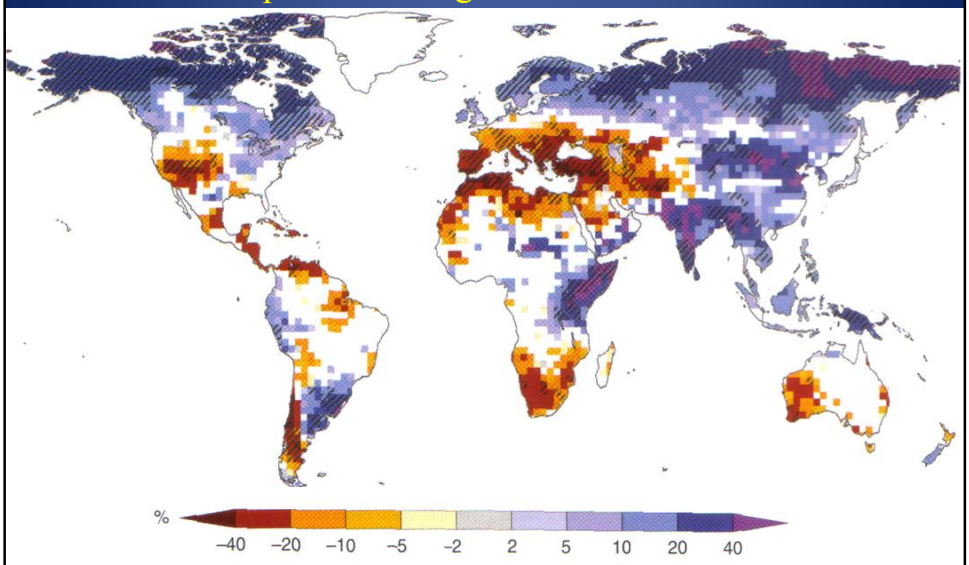
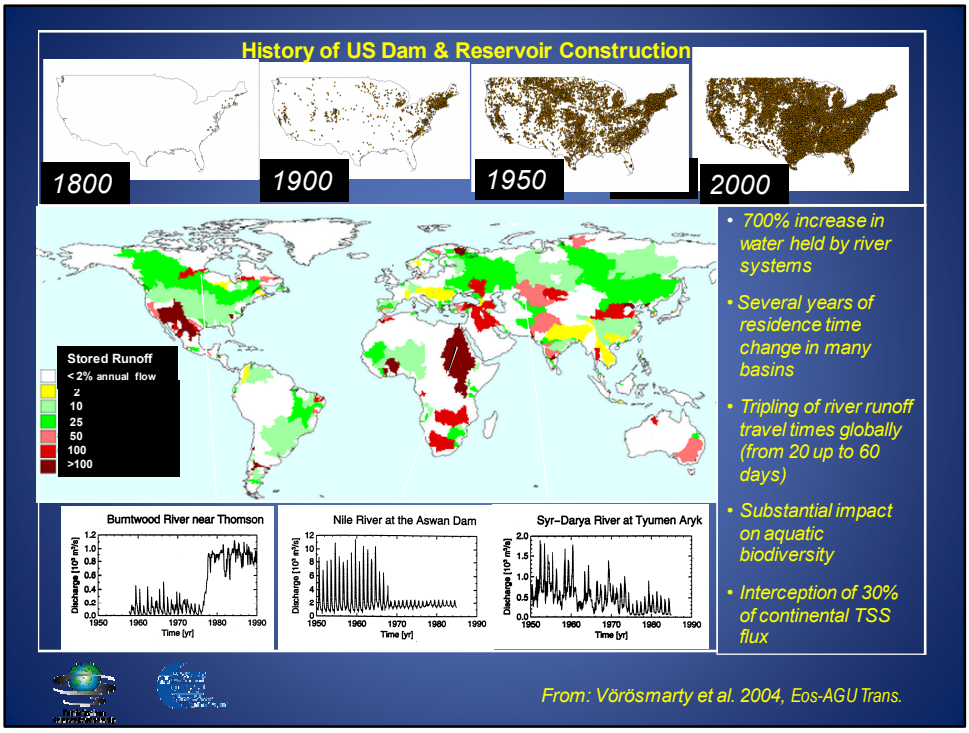
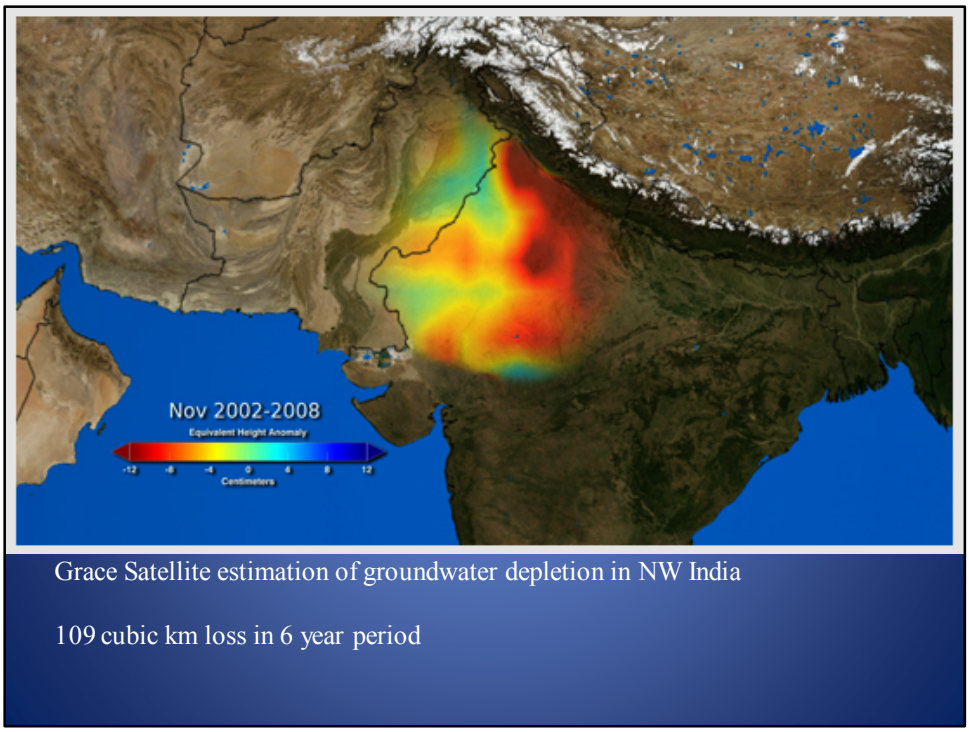


Figure 2.10: Large-scale relative changes in annual runoff for the period 2090–2099, relative to 1980–1999. White areas are where less than 66% of the ensemble of 12 models agree on the sign of change, and hatched areas are where more than 90% of models agree on the sign of change (Milly et al., 2005). [Based on SYR Figure 3.5 and WGII Figure 3.4]

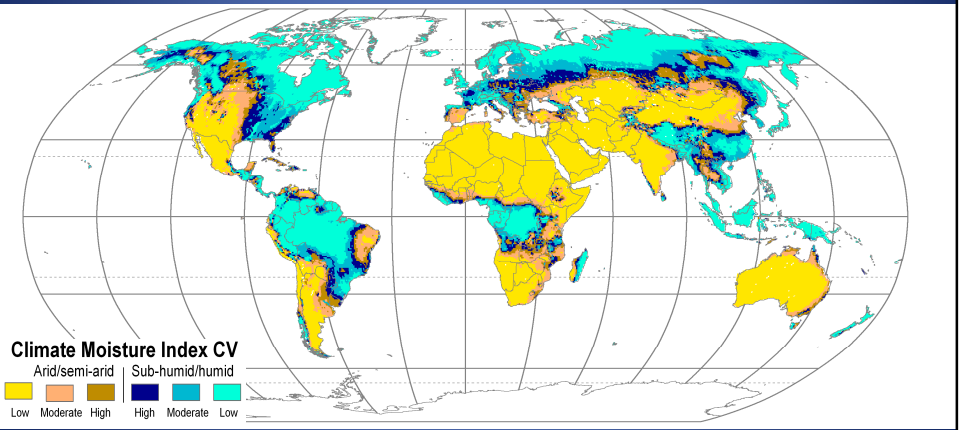




Grace Satellite estimation of groundwater depletion in NW India

109 cubic km loss in 6 year period

The Climate Moisture Index, representing climatically-induced water variability



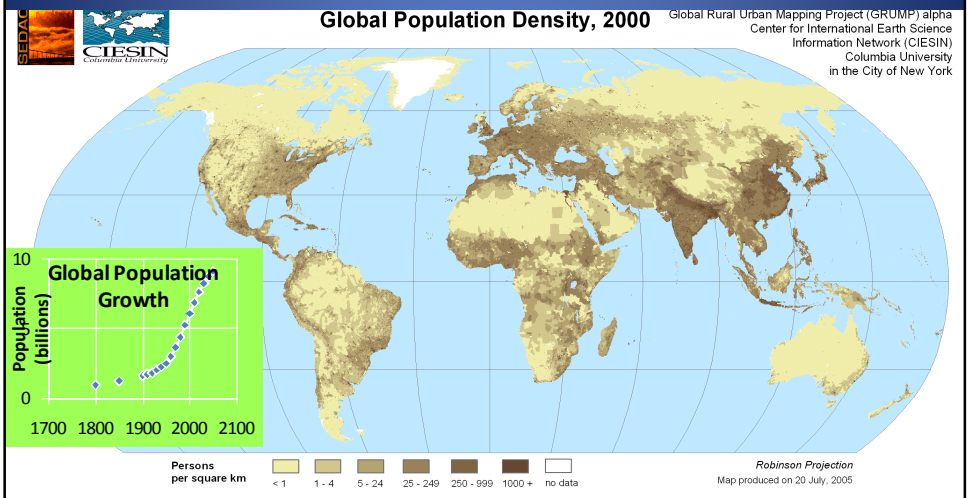
Change and uncertainty within broader contexts

Changes within the broader social, economic and political contexts – affecting water resources and their management:

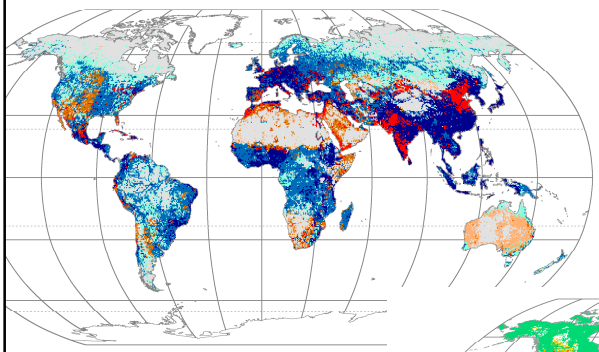
- Demographics – population changes
- Geopolitical changes and realignments
- Unrest/warfare – global terrorism
- Financial crises
- Health risks and vulnerabilities - pandemics

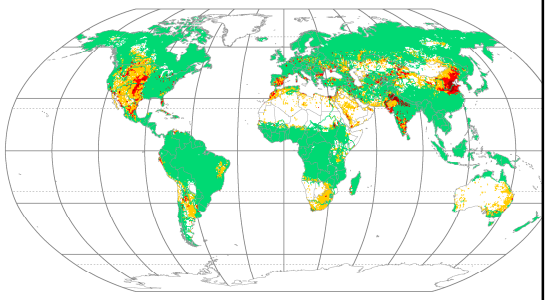
Population changes

- Rapid growth versus significant declines
- Movements: rural to urban; between countries and regions



Regions of stress





Non-sustainable use

Important elements and issues to be incorporated into the strategy for the next hydrological decade

- Both purely hydrological and water resources management issues
- ***Change*** and ***uncertainty*** in both hydrology and in the social, economic and political contexts
- ***Risks*** and ***vulnerabilities*** for human well-being and livelihoods

International co-operation for the new decade

- Links of IAHS within the ICSU / IUGG framework (with IUGG Associations in particular IAMAS, (Atmoshere) IAPSO (Oceans) and IACS (Cryosphere); and with other Unions eg IUGS (Geology), IGU (Geography) and IUBS (Biology));
- Links with United Nations bodies (in particular with our long term partners, UNESCO, WMO and IAEA, but also with others ISDR (Disasters), FAO (Food), WHO (Health), UNEP (Environment));
- Bilateral and multi-lateral co-operation between nations;
- Co-operation between national Hydrological Associations and Societies;
- Co-operation with AGU and EGU