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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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
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 2.5 and WGI Figure 3.4]
History of US Dam & Reservoir Construction

- 700% increase in water held by river systems
- Several years of residence time change in many basins
- Trapping of river runoff travel times globally (from 20 up to 60 days)
- Substantial impact on aquatic biodiversity
- Interception of 30% of continental TSS flux


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

Global Population Density, 2000

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