

Zero draft IHP-IX

1. **[PRIORITY 3] Addressing data and information gap in support of water resources management:**

- Information on quantity and quality of water resources – hydric behavior: surface, groundwater, river deltas, wetlands, glaciers (desertification)
- Modelling and forecasting the global water cycle elements within the different compartments (soil, unsaturated zones, saturated zones of aquifer, runoff)
- Hydrological and water quality modelling at the basins scale
- Fluvial dynamics (erosion and sedimentation) and pollutants transport
- Information on water use, demand, social, economic, etc.

Using:

- big data and satellite data & application, AI and data assimilation (machine learning)
- field measurements and experimental hydrology
- data and knowledge sharing + tools (ICT) for sharing ([open source data sharing/processing tools?](#))
- stakeholder participation (citizen science)

2. **Supporting decision making and assessing uncertainty in a dynamic reality**

- Adaptation to global changes in the Anthropocene
 - Science of the climate change and climatic variability
 - Economic and demographic growth (consequence in terms of water demand for various uses (water supply, agriculture, industry, tourism, as well as ecosystems in terms of quantity and quality)
- Resilience to hydrological hazards and disasters
 - Vulnerability and resilience of cities/urban environments to water scarcity and disasters
 - Drought and floods ([cyclic event, how to bridge the gap-storage?? Underground reservoir \[MAR\]/; storm water management?](#))
- **[PRIORITY 1] Water quality and pollution control**
 - Emerging pollutants (solutions to reduce emission at sources, solutions of remediations, of water treatment, etc.) and other “regular” contaminants related to agriculture (pesticides, nitrates, etc.)
 - Marine-freshwater interaction (source-to-sea approach to water quality)
 - Saltwater intrusion
 - Environmental flow – [build capacity for clarity](#)
 - Development of new technologies for adaptation, water quality, sanitation / use of traditional or indigenous knowledge
 - Health of waterways
 - Surface-groundwater interactions/[conjunctive use?](#)

Using:

- adaptation matrices
- impact assessment, management tool, modelling
- flexible regulatory and institutional framework

3. **[PRIORITY 2] Achieving sustainable water management**

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- Non-conventional water resources management: wastewater reuse (direct and indirect with Managed Aquifer Recharge, Aquifer Soil Treatment, Aquifer Soil Recovery and Transfer and Recovery, etc.), desalination, ice shields, fog harvesting, permafrost management of demand), and link with water-food nexus
- Eco-hydrology + ecosystem services, nature based solutions
- Circular economy from a water / wastewater perspective
- Water Environment Food Energy nexus, synergies and tradeoffs between SDGs
- Water use efficiency?
- Storm water management
- Comparative advantage on use of surface and groundwater

Using:

- o mobile dissemination of water information
- o Online monitoring of water use information, abstraction, and water quality, etc.
- o Online water supply and demand by water services providers, etc.

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Crosscutting issues:

Water education

- Water education: “water wise citizens building” - education for pro-activity based on capacity building leading to stewardship
- Sustainable water education/capacity development institutions, interfacing knowledge systems, including indigenous knowledge
- water education for youth within a sustainable development context, especially for developing countries
- water education for the fourth industrial revolution;
- Water education for policy makers/politicians

Water governance

- Integrated management of the resources based on legal frameworks from a science perspective
 - o Changing of unsustainable patterns of consumption and production at the local sources
 - o Sustainable use of local water resources as the natural resource base of local economic and social development
 - o Social sciences and implementation of water regulations
- Water resources planning and management at the basin scale
- Good practices and their direct and indirect effects on ecosystems services provided by the receiving ecosystems Institutional innovation of urban water governance systems in cities for climate change mitigation
- Water governance-participatory frameworks – decision and management tools – stakeholder involvement
 - o Water governance indicators
 - o Rights, responsibilities and protection of community leaders and water protectors

- Multi actor approach: Develop locally differentiated schemes of water governance for collaboration between stakeholders, managing authorities, local communities
 - Institutional arrangements for sustainable water management of small urban municipalities
 - Coordinated planning – governance at various levels, recognizing local and ancestral systems of water governance
- Transboundary waters
 - cooperation framework for transboundary water issues (compromises-negotiations);
 - Transboundary implementation of climate change adaptation measures for the increase of adaptive capacities of citizens
 - international/transboundary river ([water resources?](#)) management [[governance – data and information sharing!](#)]

ICT tools

- Control software algorithms for real time management of the small water retention and involvement of stakeholders in their design – sustainability of the implementation
- Open source decision support systems for using natural and technical small water retention at farm level and in urban systems