The Blue-Gold Rush: results of the IMC synthesis workshop on water management and related power structures

Introduction

The International Mountain Conference (IMC) Synthesis Workshop *The blue gold rush – water management and related power structures* was held on Thursday 15th September 2022 and co-organised by Dr Stefan Schneiderbauer (United Nations University Institute for Environment and Human Security – UNU-EHS, and Eurac Research), Jess Delves (UNU-EHS and Eurac Research), Dr Sunita Chaudhary (International Centre for Integrated Mountain Development – ICIMOD) and Dr Daniel Viviroli (University of Zurich). The Synthesis Workshop invited representatives from eleven Focus Sessions of the IMC to present key results from their sessions and to participate in the Synthesis Workshop activities.

Going beyond a simple synthesis of Focus Session results, the workshop groupwork activity aimed to identify current and future challenges in water management and associate these challenges with their spatial and temporal scales. The workshop participants were guided to reflect on the role of power structures in the availability, access to and quality of water, with the aim of highlighting the multidimensionality of the many challenges to water management, which stretch across space, time and governance scales. To foster this more holistic perspective on water management, the larger group was divided into working groups based on the foci of international UN frameworks, namely: Disaster Risk Reduction (Sendai Framework); Climate Change (UNFCCC & Paris Agreement); urban settlements and energy (UN Habitat & IRENA); land degradation, biodiversity and wetlands (UNNCD, UNCBD & RAMSAR). Groups were asked to identify current and future challenges to water management relating to their frameworks' focus, and to situate these challenges on a graph according to the spatial and temporal scales at which they occur.

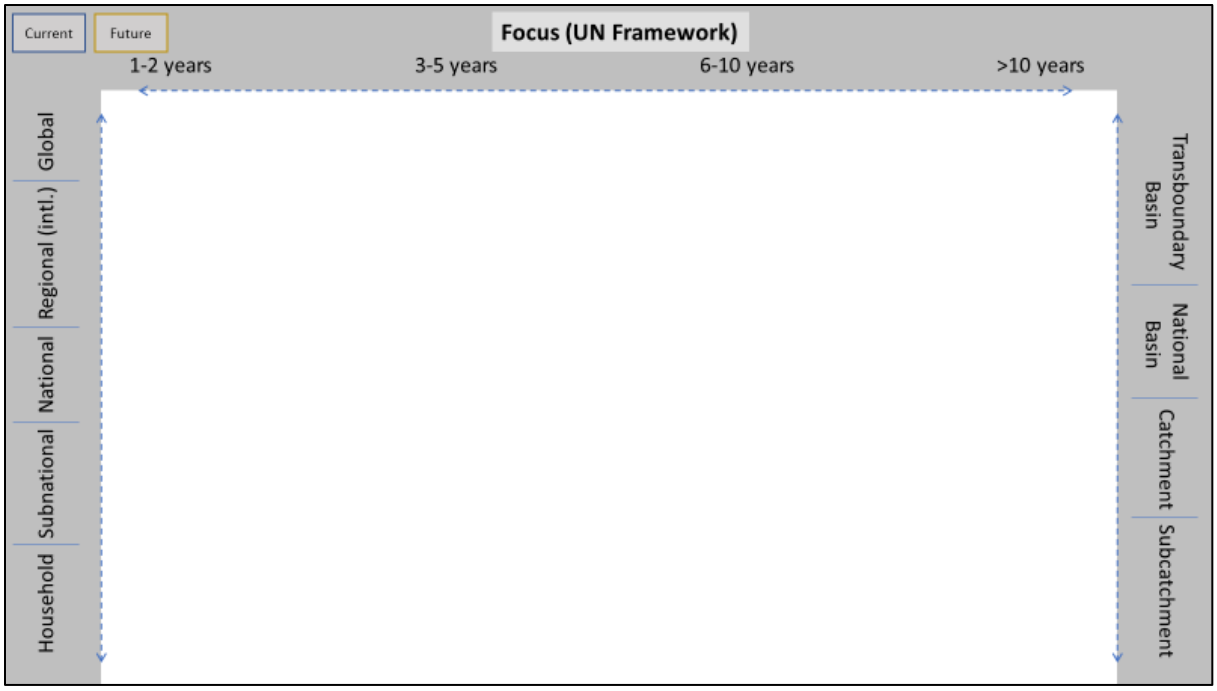


Figure 1 Example of the framework provided to working groups to locate current and future challenges on spatial and temporal scales

Results

The presentations of Focus Session results provided a first input for the groupwork activities. The current and future challenges identified in the groupwork activities broadly fall in to the four categories below. See Annex 1 for the results from each working group.

Decreasing water availability due to glacier retreat and reduced precipitation and water stored as snow. Additionally, anthropogenic pollution is causing decreased availability of clean water. This is impacting not only on drinking water availability but also on hydropower production. New and existing users are competing for diminishing water resources, increasing (the potential for) conflict. Considering the future, it was identified that there is a severe lack of planning for post-peak-water and not enough emphasis on reducing consumption for a reduced-water-availability-future. Part of this future planning should involve constructing water storage infrastructure now for the future.

Adaptation, specifically Nature-Based Solutions (NbS), was noted as having limited uptake due to ineffective communication of NbS projects and due to the time required for benefits to be perceived by local populations. Adaptation measures were said to be driven more by policy and research needs/desires rather than end-user needs. One Focus Session found that the increased water supply from glacier melt was not being used, although the point was also raised that developing systems that depend on this water would be high-risk if they did not include an exit-strategy once peak water is reached. Considering future challenges, adaptation was criticised for not being transformational, and instead being based on incremental change, or only coping strategies.

Governance at difference scales was prominent, ranging from the very local to transboundary and transnational management of water. At the local scale, issues of water ownership and the

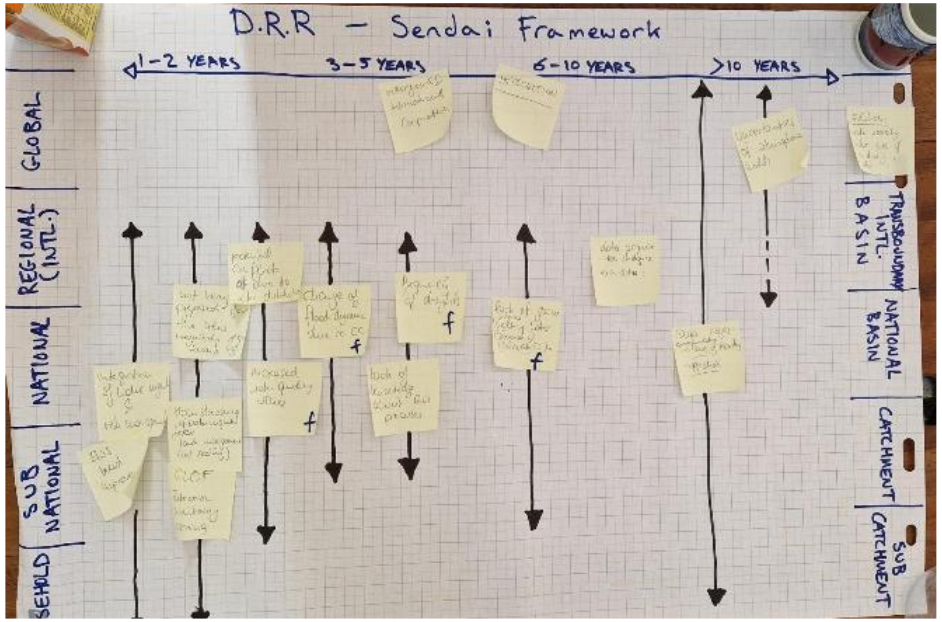
infrastructure that stores, transports and delivers it, was addressed in the context of irrigation systems. At the basin scale, a key challenge was the fragmentation of management structures and historical divisions between groups in the basin due to previous political/social conflicts. At the transnational scale, the differential power between nation states was highlighted in infrastructure projects where larger/more powerful states fund large dam projects in neighbouring, upstream states. The issue of differential value systems between stakeholders was also a cause of conflict, for example between conservationists and dam constructors.

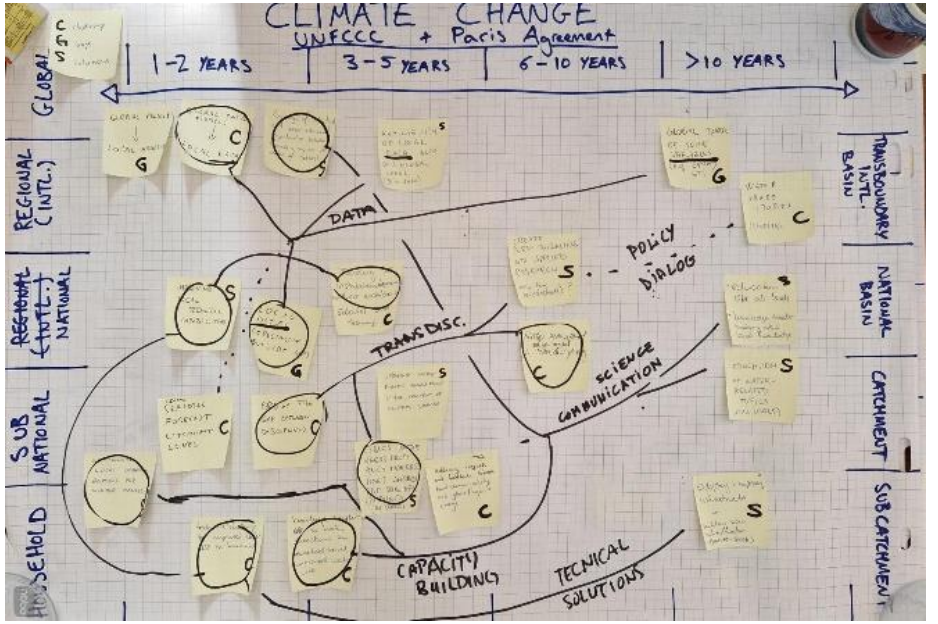
Knowledge gaps were listed. Fundamentally, a lack of data in various fields poses challenges for the understanding, modelling and thus projections of climatic, hydrological and social systems. Not only is historical data not available, but where monitoring agencies continue to be underfunded there is a lack of instrumentation and capacity to understand how climate influences hydrology. It was highlighted that water management requires an interdisciplinary understanding of social-ecological systems which is often lacking, and that science needs to work more closely with practitioners. A lack of data and knowledge often results in missing early warning systems, thereby increasing risk.

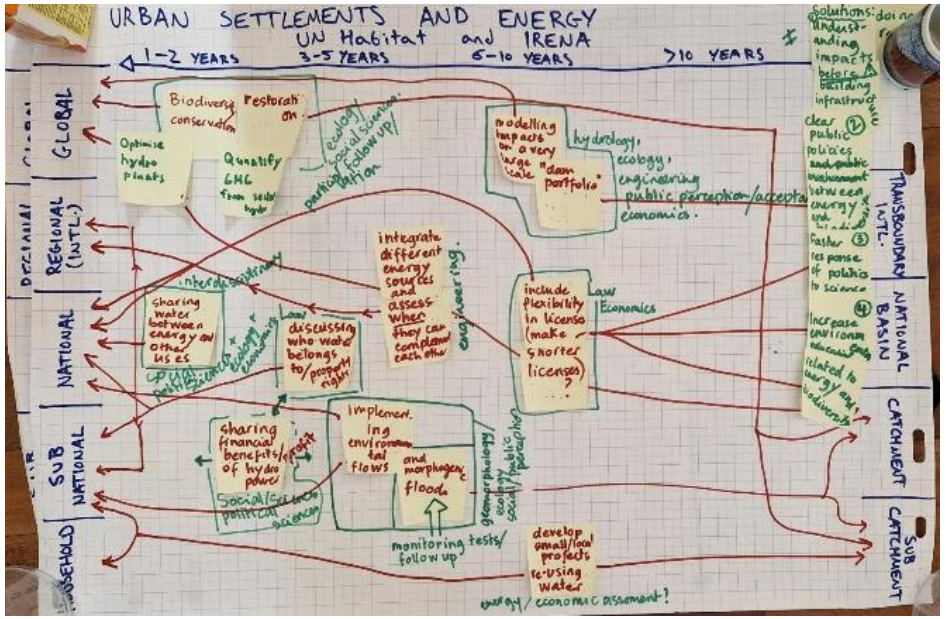
Conclusions

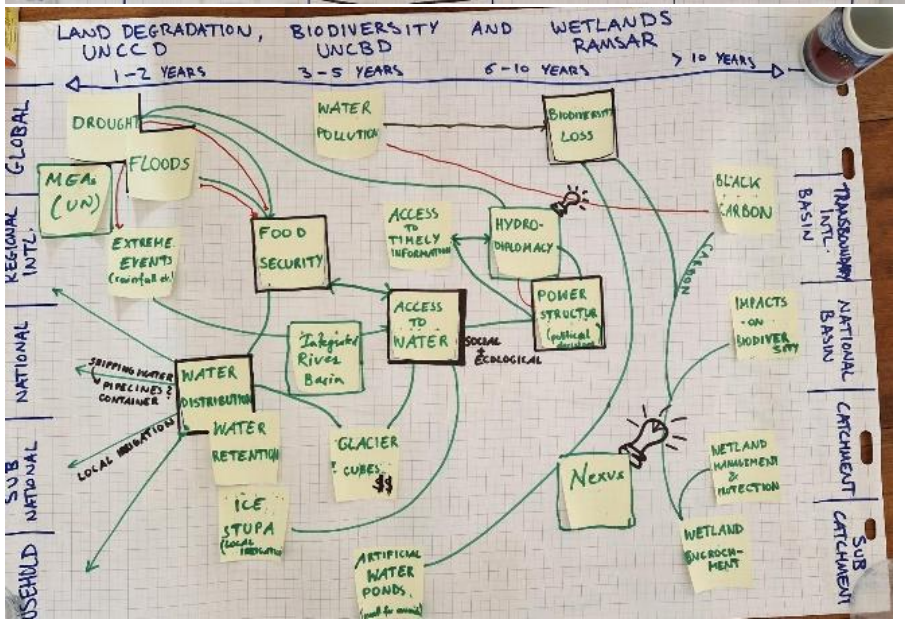
Identified challenges that recurred across the four working groups dealt with **data needs, collaboration** and **education.** Regarding data, there is a clear need the need for **more, better quality data** for an improved understanding of hydrological dynamics, particularly in relation to climate change. The need for more **inter- and transdisciplinary approaches** in water management in order to account for the diversity of stakeholders and multidimensionality necessary in water management. Finally, **education at all levels** – from education on household water management through to the development of higher education curricula – was noted as important for better use of water resources.

Annex 1. Results of workshop group work.

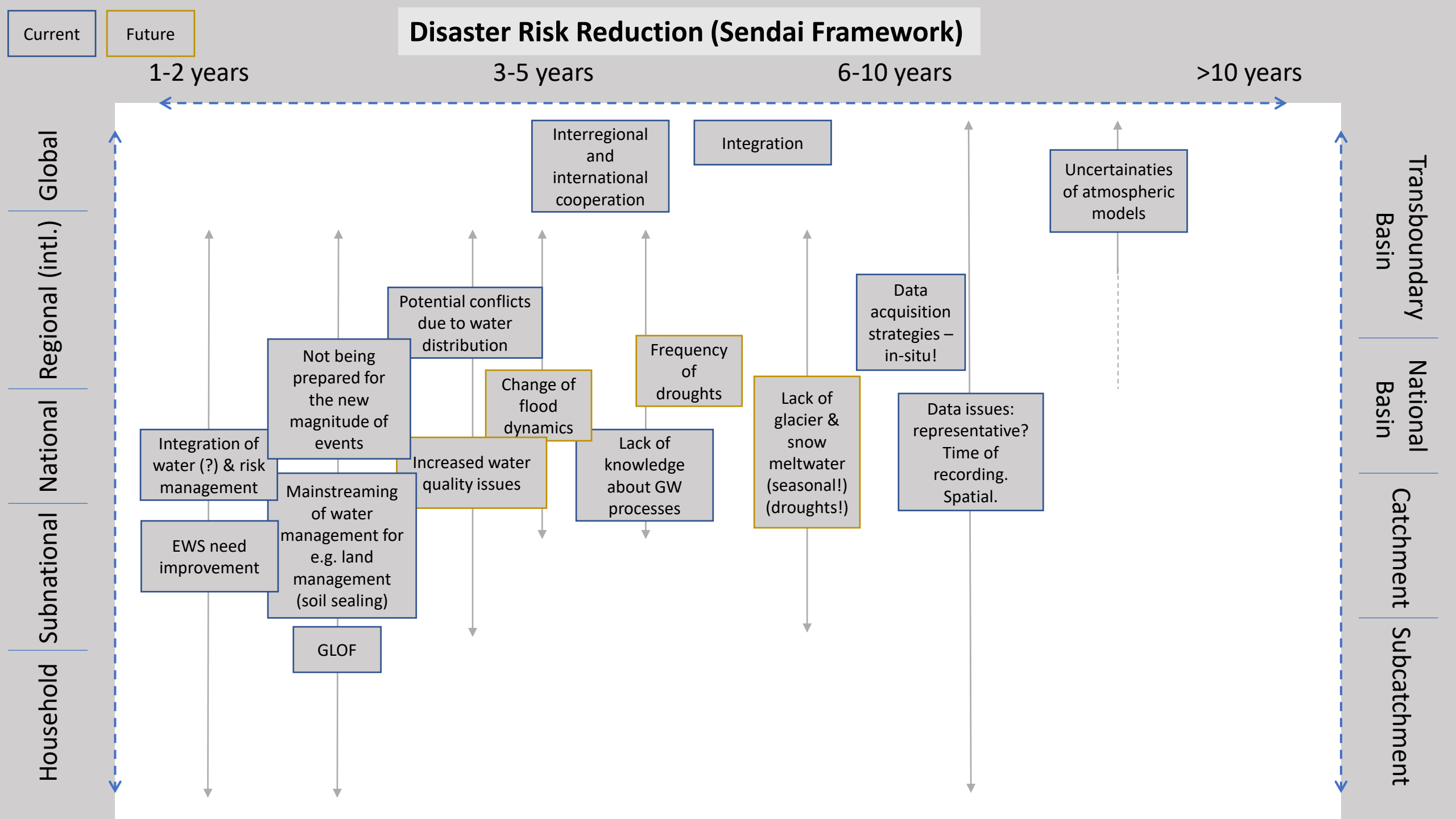


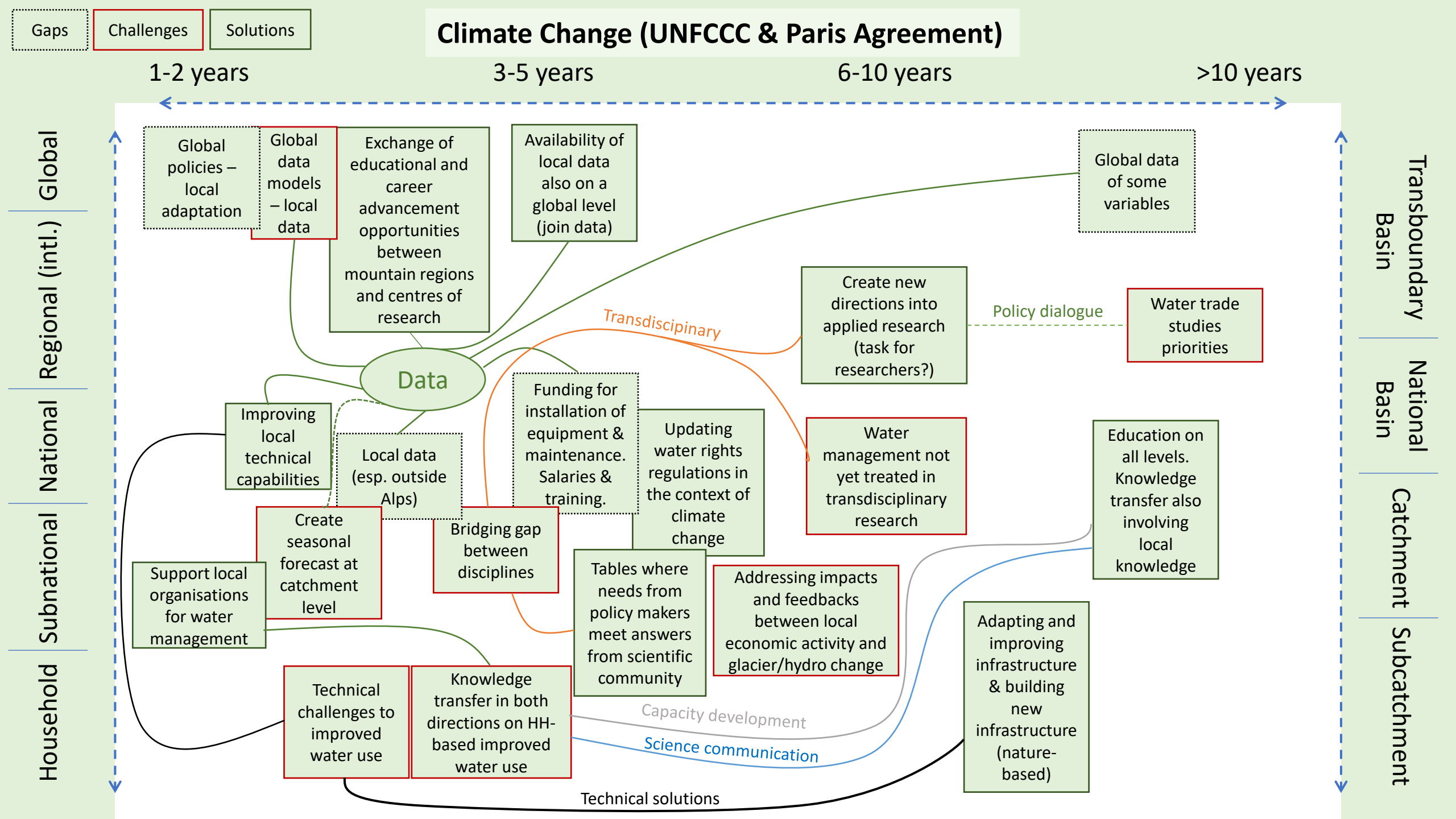




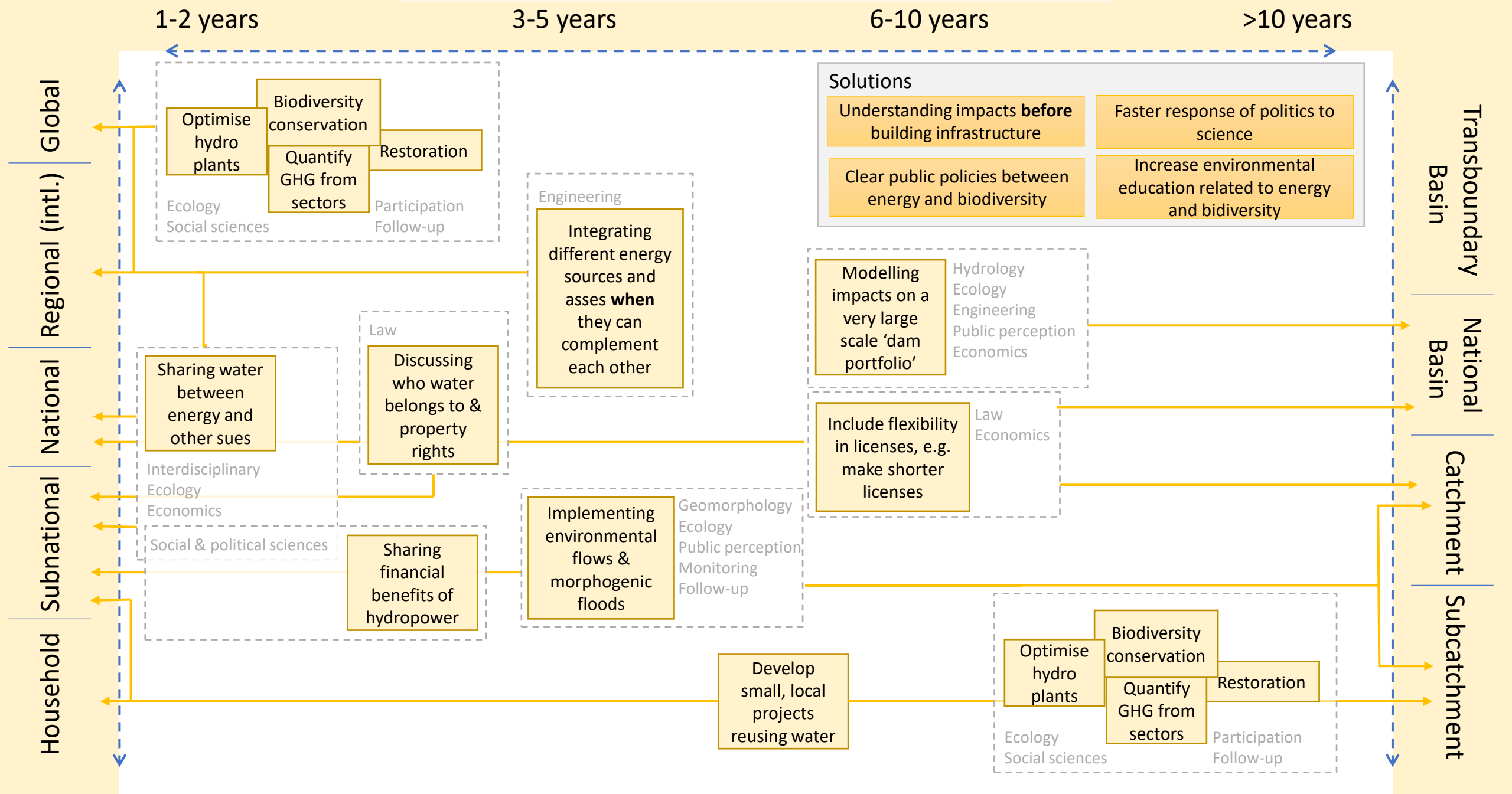


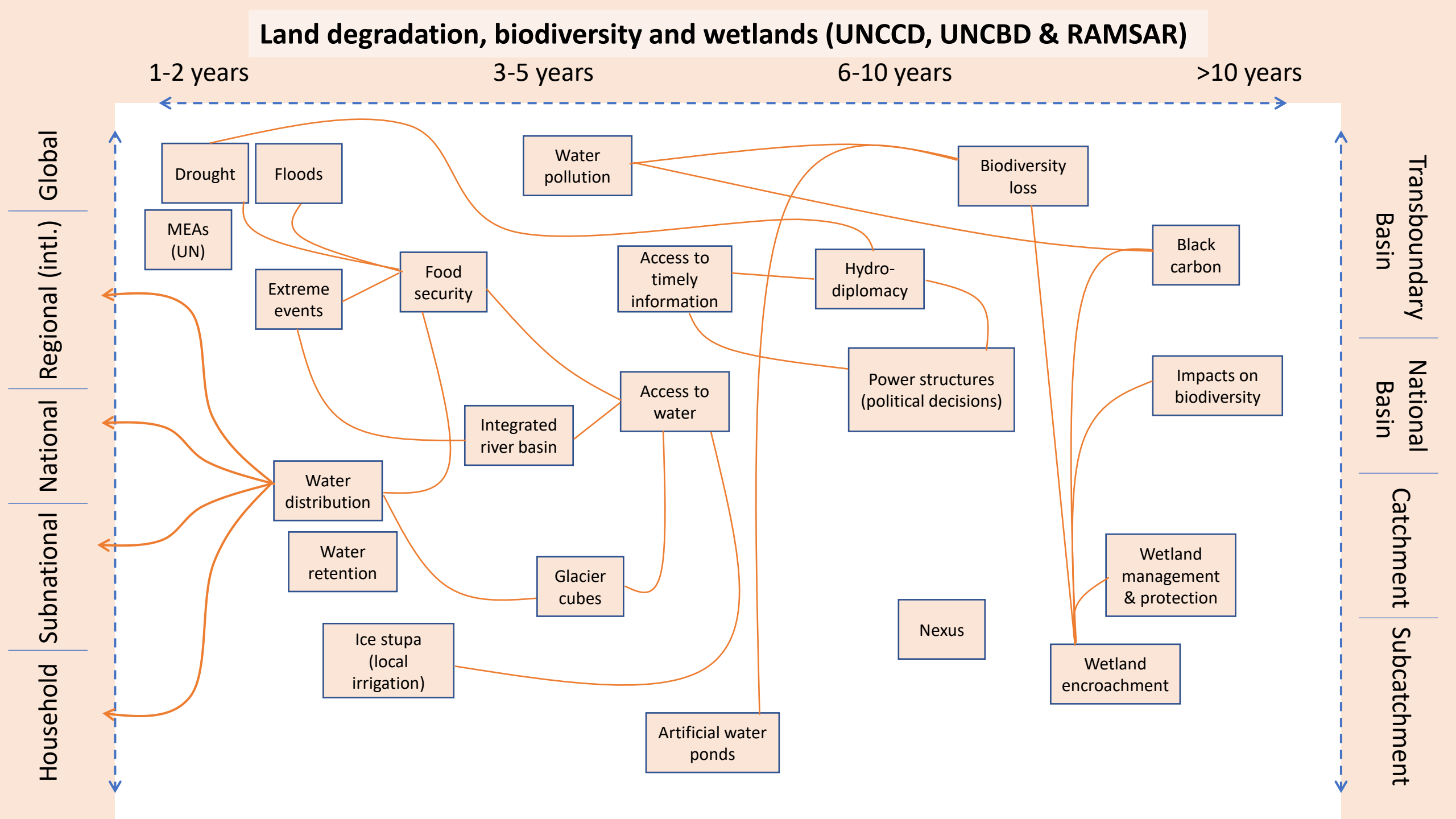
Below follows the digitalisation of the above workshop results.


Current
Future
Disaster Risk Reduction (Sendai Framework)
1-2 years
3-5 years
6-10 years
>10 years
Global
Regional (intl.)
National
Subnational
Household
Transboundary Basin
National Basin
Catchment
Subcatchment
Interregional and international cooperation
Integration
Uncertainaties of atmospheric models
Potential conflicts due to water distribution
Not being prepared for the new magnitude of events
Change of flood dynamics
Frequency of droughts
Data acquisition strategies – in-situ!
Integration of water (?) & risk management
Increased water quality issues
Lack of knowledge about GW processes
Lack of glacier & snow meltwater (seasonal!) (droughts!)
Data issues: representative? Time of recording. Spatial.
EWS need improvement
Mainstreaming of water management for e.g. land management (soil sealing)
GLOF


Gaps
Challenges
Solutions
Climate Change (UNFCCC & Paris Agreement)
1-2 years
3-5 years
6-10 years
>10 years
Global
Regional (intl.)
National
Subnational
Household
Transboundary Basin
National Basin
Catchment
Subcatchment
Global policies – local adaptation
Global data models – local data
Exchange of educational and career advancement opportunities between mountain regions and centres of research
Availability of local data also on a global level (join data)
Global data of some variables
Data
Transdiscipinary
Create new directions into applied research (task for researchers?)
Policy dialogue
Water trade studies priorities
Improving local technical capabilities
Local data (esp. outside Alps)
Funding for installation of equipment & maintenance. Salaries & training.
Updating water rights regulations in the context of climate change
Water management not yet treated in transdisciplinary research
Education on all levels. Knowledge transfer also involving local knowledge
Create seasonal forecast at catchment level
Bridging gap between disciplines
Support local organisations for water management
Tables where needs from policy makers meet answers from scientific community
Addressing impacts and feedbacks between local economic activity and glacier/hydro change
Adapting and improving infrastructure & building new infrastructure (nature-based)
Technical challenges to improved water use
Knowledge transfer in both directions on HH-based improved water use
Capacity development
Science communication
Technical solutions

Urban settlements and energy (UN Habitat & IRENA)




Land degradation, biodiversity and wetlands (UNCCD, UNCBD & RAMSAR)
1-2 years
3-5 years
6-10 years
>10 years
Global
Regional (intl.)
National
Subnational
Household
Transboundary Basin
National Basin
Catchment
Subcatchment
Drought
Floods
MEAs (UN)
Extreme events
Food security
Water pollution
Biodiversity loss
Black carbon
Access to timely information
Hydro-diplomacy
Power structures (political decisions)
Impacts on biodiversity
Integrated river basin
Access to water
Water distribution
Water retention
Glacier cubes
Ice stupa (local irrigation)
Artificial water ponds
Nexus
Wetland management & protection
Wetland encroachment