

The Evolving Role of ICIMOD in the Development of Water Storage Capacity

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ICIMOD, in collaboration with its knowledge partners, plans to build on its areas of expertise to become a recognised regional knowledge centre for water: a centre with credible information, appropriate technology, and integrated approaches, all aimed at contributing to the sustainable development of water resources. Water scarcity is a growing problem in the Hindu Kush-Himalaya (HKH) region, exacerbated by climate change.

When the consequences of climate change are superimposed on the high degree of variability in rainfall over the year, then it is clear that the threat of water scarcity could pose a serious challenge to the approximately 1.3 billion people living in the ten river basins that have their origins in the region. A critical issue, then, is how to store massive quantities of rainfall in very short periods so that it can be used over the entire year. To this end, ICIMOD is working

Glaciers and glacial lakes store enormous amounts of water, Khumbu, Nepal



to contribute to the knowledge on water storage capacity, its best practices, and development in the Hindu Kush-Himalayan region. The preceding articles in this issue of Sustainable Mountain Development have identified knowledge gaps and highlighted the need to develop institutional capacity for water governance. This article will discuss the evolving role of ICIMOD and its knowledge partners in the development of water storage capacity in the Hindu Kush-Himalayan region.

ICIMOD's strategic programmes and its knowledge partners

In an era where the effects of global climate change affect everyone, ICIMOD is endeavouring to bring the special plight of mountain people and environments to the attention of the world. The premises behind the water-related activities at ICIMOD are (a) that water is the single most important resource and source of wealth for the people of the HKH region, but it is also a source of catastrophic hazards; (b) that the conservation of water, its sustainable management, and negotiated future use are of paramount importance; and (c) that due to the crucial role that water has for livelihoods in the mountains and elsewhere, there is a need to see that livelihoods are adequately adapted to environmental changes in general and to climate change in particular.

ICIMOD's 'Vision' is to see that the mountain population of the greater Himalayas enjoys improved well-being in a sustainable global environment, and its 'Mission' is to enable and facilitate their equitable and sustainable well-being by supporting sustainable mountain development through active regional cooperation. ICIMOD's Vision and Mission are pursued through its three strategic programmes: Integrated Water and Hazard Management (IWHM), Environmental Change and Ecosystem services (ECES), and Sustainable Livelihoods and Poverty Reduction (SLPR); supported by a cross-cutting Integrated Knowledge Management section. The programmes are interdependent and interlinked. All three conduct activities related to development of water storage capacity, for example, strengthening upstream-downstream linkages at IWHM, promoting integrated watershed management at ECES, and crafting mechanisms of rewards and compensation for environmental services at SLPR.

In collaboration with its knowledge partners in the region and around the globe, ICIMOD endeavours to contribute to meeting knowledge gaps and building the institutional capacity necessary for the development of water storage capacity in the region. ICIMOD's knowledge partners include the nodal agencies in its eight regional member countries. Research centres



Table: Knowledge Gaps and Institutional Requirements

Strategic elements and options for water storage	Knowledge gaps	Institutional capacity building needs		
		Community water governance	Rewards and compensation for ecosystem services	Transboundary cooperation mechanism
Cryosphere	Need to understand the response of glacier systems to climate change (see Armstrong et al. *)	Need to develop and institutionalise glacier mass balance monitoring schemes		Need to exchange information on glacier research and monitoring; need to ensure representativeness in the regional context of glaciers selected for in-depth studies
Wetland conservation	Need to understand the vulnerability of wetlands (see Harris et al. *)	Need mechanism for communities depending on wetlands to participate in wetland conservation	Need mechanism for downstream users to reward upstream communities for wetland conservation and management	
Water harvesting and watershed management, incl. soil moisture maintenance	Need to study the support of traditional institutions for water storage management (see Upadhyaya*)	Need mechanism for active community participation in watershed management	Need mechanism for downstream users to reward upstream communities for good watershed management	
Groundwater aquifer recharge	Need to gather information about groundwater aquifer systems (see Shrestha*)	Need community level mechanism for developing aquifers based on principles of shared construction and maintenance costs		Need mechanism for managing aquifer recharge and groundwater withdrawal from the three transboundary aquifers in the region
Reservoirs for water storage	Need to explore the potential for using natural lakes for storage; and for harnessing and storing of glacial and snow meltwater at high altitudes (see Vaidya*)	Need mechanism for making local community contributions to construction and maintenance of reservoirs, and for allocating water to local farms and families		Need mechanism for sharing costs and benefits of large storage reservoir projects

*References in the knowledge gaps column relate to the preceding articles in this publication.

and universities in the region are its obvious allies in promoting the mountain agenda. Of particular importance are the national institutions that regional member countries have recently created in response to growing concern about global climate change and increased natural hazard risks. ICIMOD also promotes long-term partnerships with international centres of excellence as a means to acquire the specific expertise it needs in technical areas.

Knowledge gaps and institutional requirements for development of water storage capacity

The preceding articles in this publication indicate that it is possible to utilise the potential of water storage capacity for adaptation to climate change. However, there is a need to look for ways to turn the natural storage options from a passive source to a planned active source. Appropriate institutional mechanisms for water governance are needed for this.

Traditional institutional mechanisms concerning community water governance play an important role in the success of the initiatives that harness natural systems. Institutional mechanisms would also be necessary to facilitate the downstream beneficiaries of ecosystem services to reward and compensate the upstream providers of those services. Furthermore, improved institutional mechanisms are needed to encourage nations that share common rivers to cooperate in building sustainable water storage systems.

To fully harness the potential of storage in the region, the knowledge gaps on the cryosphere and biosphere will need to be addressed. Scientific information and knowledge would also provide the basis for implementation of all these institutional mechanisms, whether it be the information necessary for water allocation, for the valuation of ecosystem services, or for sharing benefits and costs of dammed reservoirs. The knowledge gaps and needs for building institutional capacity for water storage options are summarised in the Table.

ICIMOD's role in the development of water storage capacity

In collaboration with its knowledge partners, ICIMOD would like to play a role in closing the knowledge gaps and in building institutional capacity. It could initiate new activities as well as promoting ongoing activities. The areas of opportunities where ICIMOD could play a role are highlighted below:

- **Water scarcity risk assessment:** Conducting water balance and water accounting studies to identify areas of water deficit in time and space and the sources and uses of water; developing water availability scenarios in response to climate change; conducting sensitivity analyses of the planned changes in water storage mechanisms on the hydrological regime
- **Cryosphere:** Monitoring of changes in snow and ice; studying the monthly contribution of meltwater to river flow
- **Wetland conservation:** Capacity building, through training programmes, on wetland conservation and management in the HKH region; undertaking the valuation of aquatic ecosystem services provided by wetlands
- **Water harvesting and watershed management:** Documenting local knowledge on traditional water harvesting systems; assessing traditional water governance; conducting training on watershed management and on traditional and modern water harvesting systems

- **Groundwater aquifer recharge:** Capacity building, through training, on watershed management and rainwater harvesting for improving water infiltration and groundwater aquifer recharge
- **Reservoirs for water storage:** Capacity building through training on modern water storage systems involving small and large reservoirs; promoting technology exchange on the storage potential of glacial lakes and glacial and snowmelt water at high altitudes, with mountain systems beyond the HKH region such as the Alps and the Andes

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ICIMOD seeks to contribute to the sustainable improvement of livelihoods, to the mitigation and resilience of environmental change, and to the optimal use of water resources in the Hindu Kush-Himalayan region. In this process, it will continue to play an active role in the development of water storage capacity in the region in collaboration with its knowledge partners.

Will hill farmers be the water managers of the future?

