River Basins

Improved water resource management is essential for the sustainable development of the Hindu Kush Himalayan region and downstream communities. Countries in the region increasingly recognize that the sustainable development of the economic potential of river systems – for domestic use, fisheries, hydropower, navigation, and irrigation – can reduce poverty, improve livelihoods, conserve ecosystems, and contribute to drought and flood management. River basin management promotes meaningful interaction between various actors at a basin-wide scale to maximize benefits while minimizing adverse effects.

Effective water management in the region depends on strong regional water cooperation as an important mechanism to support informed decision

"ICIMOD is well positioned to lead the Koshi Basin Programme because it is an intergovernmental organization with 29 years of experience in the region, thereby making it an important platform for dialogue."

– **Russell Rollason**, Australian Agency for International Development

Zoige wetlands, China

making. It also requires understanding of the changing water dynamics and threats to water resources in the HKH region, particularly in light of the impacts of climate change.

In 2012, ICIMOD launched its first river basin initiative, which adopts the river basin approach, to improve knowledge on future water availability and potential changes in the Koshi River basin.

Participatory work has been undertaken to prepare a similar initiative for the Indus River. New knowledge will be used to develop responsive and participatory adaptive water management strategies for local communities and at the basin-wide level. ICIMOD's work with river basins also aims to increase disaster risk reduction efforts by building the capacity of national partners and working with at-risk communities.

Mapping Impact to Enhance Regional Water Management

"You cannot manage what you cannot describe and measure. The Koshi Basin Programme provides ICIMOD and supporting researchers an opportunity to do something spectacular – to bring about a change in conventional research through action research and pathways for change.

A key outcome from the Koshi Basin Programme will be bringing the research components forward to the community and changing community perceptions of reality to what reality is."

– **Prof. Don Blackmore**, Australia, at the Koshi Basin Programme Inception Workshop.

In 2012, ICIMOD launched its first river basin management initiative, aimed at improving the management of the Koshi River basin. The Koshi River, which traverses China, Nepal, India, and Bangladesh, and its basin are witnessing dramatic change. In the face of these changes, there is an urgent need to improve understanding of the nexus between water, food, and energy; to develop new knowledge on how to address situations of too much and too little water; and to inform policy dialogue for transboundary cooperation. The Koshi Basin Programme provides a basis for regional cooperation between China, India, and Nepal to address emerging challenges and opportunities in flood risk management, food production and irrigation, economic opportunities, and energy.

Koshi basin, Nepal

The Koshi River Basin

The Koshi River basin plays a key role in the irrigation of downstream areas and has a large potential for hydropower development. However, its diverse topography, young geological formations, vast glaciation, and strong monsoon influence make it highly prone to erosion, sedimentation, and natural hazards, such as glacial lake outburst floods (GLOF), landslides and debris flow, droughts, and flood.

These events may increase in magnitude and frequency in the current context of global environmental change. Increasing population, urbanization, and encroachment have added additional pressures on the basin's freshwater ecosystems. Poor mountain women and men are often the most vulnerable to natural disasters and the least able to adapt and respond to rapid changes. Facing these challenges requires a collective effort among all stakeholders.

The Koshi Basin Programme is the first initiative for which ICIMOD conducted impact pathway mapping before the development of the initiative's initial funding proposal. This analysis helped demonstrate which activities are needed to create desired changes and the actors that must be involved. Issues of gender and equality and their linkages to drivers of change were included in the analysis, as well as the potential employment of incentive-based mechanisms to improve water use efficiency and productivity. This preliminary mapping will help guide the programme to ensure greater impacts

"There is a sound basis for why the Koshi basin was chosen for this programme – it is transboundary in nature and is a sub-basin of the Ganges, where over 600 million people are directly or indirectly impacted by issues surrounding the water-food-energy nexus. Improved management of the Koshi River basin can have positive impacts on a very large population."

– **Russell Rollason**, Australian Agency for International Development

Developing Flood Information Systems to Save Lives

In 2012, ICIMOD upgraded 23 hydrometeorological stations in four countries – Bhutan, Bangladesh, Nepal, and Pakistan – to improve national and regional flood information systems as a part of the HKH Hydrological Cycle Observation System (HKH-HYCOS) being implemented together with the World Meteorological Organization. Upgraded stations are equipped with state-of-the-art sensors and communication devices that enable the transmission of real-time rainfall and water level data. Data from over 300 stations in the HKH region feed into a Regional Flood Information System (RFIS) to improve disaster risk reduction efforts.

Automatic weather station, Bhutan

Through two regional and three national trainings on the installation and operation of hydrometeorological instruments and database management held in 2012, the project has strengthened the capacity of partners in regional member countries in hydrometeorological services and national flood information systems to improve the reliability and timeliness of their flood forecasting.

Fourteen more stations will be upgraded in 2013. The Centre has also developed and tested a community-based flood early warning system to improve disaster risk reduction. In the future, ICIMOD will also develop flood outlook products based on real-time data and hydrodynamic model to further improve flood forecasts and early warning systems.

> "Under the HKH HYCOS initiative, a National Installation and Training Workshop was conducted in Nowshera, Pakistan in September 2012. During this a number of representatives from institutions working with flood and disaster management attended a comprehensive training session. On the basis of this training, the Pakistan Meteorological Department was able to install two AWS stations in Kalam and Guips, which are working properly."
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> – **Muhammad Riaz**, Chief Meteorologist, Pakistan Meteorological Department

Women and flooding

Women play an important role in both disaster risk reduction and disaster response. At the same time, in the event of a natural disaster, such as a flood, women and girls are also more vulnerable. As ICIMOD works to improve flood forecasting in the region and develop early warning systems to better prepare and alert communities in the event of a flood, the Centre realizes the importance of identifying and addressing the specific needs of women and girls.

An 2012 assessment of early warning systems in Nepal and Bhutan through a gender lens highlighted key shortcomings in developing and implementing early warning systems that consider structural and gender-based differences between women's and men's situations following disaster. The project is now exploring options to ensure that the special needs of women and girls are included in early warning systems.

Illustration showing how the community-based flood early warning system notifies people living downstream