

Elevating river basin governance and cooperation in the HKH region

SUMMARY REPORT II
GANGES RIVER BASIN



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About

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About this report

In 2019, the Australian Water Partnership (AWP), an entity funded by the Department of Foreign Affairs and Trade (DFAT), Australian Government and managed by eWater Ltd, and the International Centre for Integrated Mountain Development (ICIMOD) signed a memorandum of understanding (MoU) aimed at strengthening bilateral water cooperation between Australia and countries of the Hindu Kush Himalayan (HKH) region (Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan). The MoU supported engagements directed at analysing challenges to and opportunities for basin-wide management of water resources across three focus basins: the Indus, Yarlung Tsangpo-Siang-Brahmaputra-Jamuna (henceforth referred to as ‘Brahmaputra’), and the Ganges.

This included analyses of issues pertaining to gender equity, disability, and social inclusion (GEDSI), upstream–downstream governance arrangements, data and knowledge availability and sharing, and

climate change resilience and adaptation. It resulted in high-level recommendations based on the available literature and global best practices for strengthening basin-wide cooperation. In a subsequent phase, the high-level recommendations were further tested and advanced through Knowledge Exchange and Dialogue sessions for each focus basin, hosted by AWP and ICIMOD and including relevant stakeholders from across the basins. This report draws on the Ganges Knowledge Exchange and Dialogue session, as well as interviews with experts who have substantial experience working in the basin. It documents the context and identifies challenges and opportunities for managing the water resources of the Ganges River Basin as developed through the phases of this engagement to date. It is a summarised version of a more detailed report by the same authors and under the ownership of ICIMOD.

Similar reports are available for the [Brahmaputra](#) and [Indus](#) river basins.

High-level recommendations

1. Use and expand upon existing bilateral agreements to stimulate multilateral cooperation:

There is no existing multilateral agreement between the countries of the Ganges River Basin. However, the history of bilateral agreements and existing avenues within these legal frameworks may catalyse movement toward multilateral basin-scale management.

2. Promote progress at a strategic level: Strategic consideration of basin-scale issues, in tandem with basin-level politics, could support progress and collaboration at the scientific and local levels, incorporating additional stakeholders and GEDSI perspectives.

3. Collect and share data to build trust: Improvement in data collection, including its standardisation, is likely to facilitate basin-wide knowledge sharing and help build trust and an openness to cooperation among stakeholders.

4. Catalyse cooperation through common goals: The shared interests among stakeholders at both the expert and community levels – which include addressing climate change, inland navigation, cultural significance, greater resilience to natural

disasters, and hydropower generation – are valuable rallying points for wider cooperation within the basin. The development of climate resilience to cope with increasingly frequent and more intense floods and droughts is especially important.

5. Support and strengthen the capacity of community groups to enhance local collaboration: This includes support for, and strengthening networks of, female water professionals, disabled people’s organisations, Indigenous groups, the landless, and other marginalised populations to collectively voice and amplify their concerns in local, subnational, national, and basin-wide public debates, dialogues, and cooperation.

6. Support the expansion of research and data collection: Supporting transboundary research groups to document existing knowledge and the success stories of women, people with disabilities, and other marginalised groups, as well as gathering data disaggregated by gender, poverty, ethnicity, disability, and other forms of marginalisation, will support inclusivity and the improvement of water management throughout the basin.



CHAPTER 1

The Ganges River Basin: An overview

HIGHLIGHTS

The Ganges River flows through China’s Tibet Autonomous Region (TAR), Nepal, India, and Bangladesh.

Some of South Asia’s poorest and most marginalised populations live on the banks of the river, and are dependent on fishing, tourism, and aquatic ecosystem services for their livelihoods.

A changing climate is certain to alter many of the characteristics of the river basin, impacting water resource management strategies and water security.

The Ganga River, as it is known in Hindi and many other South Asian languages, or the Ganges as it is known in English, is one of the great rivers of the Indian subcontinent. It is considered holy by millions of Hindus, and provides a cultural, economic, and environmental lifeline to over 600 million people who reside in its basin. The Ganges River Basin is vast and complex but demonstrates significant potential for promoting cooperation and collaboration.

Flowing through China (Tibet Autonomous Region [TAR]), Nepal, India, and Bangladesh, most of the river’s course lies within India, although its delta, shared with the Brahmaputra River, lies within Bangladesh (Lodrick & Ahmad, 2022). The Ganges flows over 2,500 kilometres (km) across the Indo-Gangetic Plain, from the heights of the Himalaya in the TAR, through mountains, valleys, and one of the world’s largest fertile river valley plains into the Bay of Bengal (Sati, 2021). The main stem, originating in the Indian state of Uttarakhand, is joined by three major tributaries from Nepal – Karnali (called Ghagra in India), Gandaki, and Koshi (called Kosi in India and Koshi in Nepal) – and together constitute a major part of the overall flow of the Ganges. Figure 1 depicts a map of the Ganges River Basin.

General and physical characteristics

Table 1 summarises the general and physical characteristics of the Ganges River Basin.

Socio-economic trends

The Ganges River Basin is home to over 600 million Indians (a little less than half of India’s population including upstream and downstream basins), of which over 200 million are below the national poverty line, over 29 million Nepalis, and millions of people in Bangladesh (Sati, 2021; World Bank, 2015). It contains over 50 of India’s cities (each with populations of more than 50,000) (Sati, 2021). The cultural values and lifestyles of the people in the river basin are intricately linked to the socio-economic dynamics in the basin, with millions of poor and disadvantaged people relying on the Ganges River for food, drinking water, agricultural work, and transportation services. Some of South Asia’s poorest and most marginalised populations live on the banks of the river, and are dependent on fishing, tourism, and aquatic ecosystem services for their livelihoods. The Ganges Basin is a global hotspot for intersecting inequalities

FIGURE 1 MAP OF THE GANGES RIVER BASIN



Source: A. Shrestha et al. (2015)

TABLE 1 GENERAL AND PHYSICAL CHARACTERISTICS OF THE GANGES RIVER BASIN

Characteristic	Description
Origin (source area)	The main stem originates at the Gaumukh/Gangotri Glacier in the state of Uttarakhand in India
Length	2,525 km
Total basin area	1,086,000 km ²
Basin countries (with share of total basin area)	India (79%), Nepal (14%), Bangladesh (4%), China (3%)
Basin physiography	For the major part, a fertile and water-rich alluvial plain, but the basin also includes mountains and valleys, prone to landslides and erosion
Climate	Varied, as the river flows through geographies ranging from an altitude of 7,000 metres above mean sea level (masl) down to sea level and contains climactic conditions ranging from perpetually cold to temperate, hot and dry, and humid at the coast
Precipitation	Average annual rainfall for the basin is 1,100 mm, varying from 390 mm to 2,000 mm
Flow	525 km3 annually where it flows from India into Bangladesh
Water uses	Agriculture, irrigation, hydroelectric power generation, fishing, industry, manufacturing, bathing, religious practices
Population	Over 600 million in India (little less than half of India’s population), over 29 million in Nepal (its entire population), and millions in Bangladesh. The exact number in the China is unknown
GDP generated within the basin	40% of India’s GDP and all of Nepal’s GDP. No basin-specific data available for the parts of the basin in Bangladesh and the TAR

Sources: FAO (2011); Sati (2021); Siderius et al. (2013);

relating to gender, caste, ethnicity, religion, and geography (for example, rural versus urban, mountains versus plains, riverbank versus upland, and upstream versus downstream) (Udas et al., 2019). As a result, the basin is considered one of the poorest areas in the world (Food and Agriculture Organization of the United Nations [FAO], 2011; Rahaman, 2009; Sati, 2021; World Bank, 2015).

A vast population in the basin is dependent upon agriculture for subsistence, and thus food security is a critical issue. Throughout its course, the banks of the Ganges are home to massive industrial and manufacturing activities, most of which are related to food, furniture, and leather production (Sati, 2021). Hydropower generation is also a substantial industry in the upstream reaches of the Ganges and many of its tributaries, in both India and Nepal (Gunatilake et al., 2020; Sati, 2021).

The Ganges is also a tremendous cultural resource. It attracts substantial tourism through pilgrimages and the hosting of religious events, festivals, and activities along its banks throughout each year (Mallet, 2017; Sati, 2021).

However, in recent years, rapid outmigration from rural to urban areas and labour migration overseas has led to the underutilisation of agricultural land, the feminisation of households and communities (as men often migrate without their families), and changes in livelihood practices, often increasing the vulnerability of marginalised groups (Dilshad et al., 2019; Ojha et al., 2017).

Environmental characteristics and climate change impacts

Water pollution is a significant issue for the Ganges River and those dependent on it, due to rapid industrialisation, urbanisation, and significant sewage discharge. New and increasingly difficult to manage contaminants have emerged in the system, such as plastics and microplastics, as well as a variety of endocrine disruptors from antibiotics and other medicines ingested by humans and administered to animals (Somnath Bandyopadhyay, personal communication, 27 September 2022). The river's water quality varies seasonally, as it is influenced by the substantial precipitation throughout the area, which is especially abundant during the strong monsoon season.

Floods and droughts are common hazards in the Ganges River Basin, likely to increase in both frequency and severity due to climate change, negatively affecting both environmental and human health (Hossain et al., 2020; Sadoff et al., 2013; Sati, 2021). Overspills from main rivers or tributaries, as well as direct rainfall during the monsoon – which lasts 3–4 months of the year and within which 80–85 per cent of annual rainfall occurs – cause disastrous flooding throughout the basin on a yearly basis (Sati, 2021; Shrestha et al., 2015). However, despite flooding during the monsoon season, water scarcity and droughts often prevail during the dry seasons in Bangladesh and other countries of the basin (FAO, 2011; Sati, 2021). The impacts of such climate change risks are disproportionately high among women, people with disabilities, lower caste groups, and other marginalised peoples (Resurrección et al., 2019).

A changing climate is certain to alter many of the characteristics of the Ganges River Basin, as future scenarios project up to a 27 per cent increase in summer rainfall over most of the basin by 2050 (Chow et al., 2022; FAO, 2011; Shrestha & Nepal, 2015). Climate change impacts will likely include increased temperatures and melting glaciers, which, paired with increased rainfall, will increase run-off, alter evaporative fluxes, change water use patterns across all sectors, and, ultimately, impact water resource management strategies and water security throughout the basin.

The state of basin governance: Relevant treaties, policies, and agreements

There is no multilateral regional or basin-level agreement or regulatory framework in the Ganges River Basin. Historically, governance within the Ganges Basin has been driven by a set of bilateral agreements between countries, largely addressing specific, national-level concerns or individual infrastructure projects. The agreements between the governments of India and Nepal – on the Kosi Project (the ‘Kosi Agreement’) (1954), the Gandak Irrigation and Power Project (the ‘Gandak Agreement’) (1959), and the Mahakali Treaty 1996 – and the governments of India and Bangladesh – the Ganges Water Sharing Treaty (1996) and the Framework Agreement on Cooperation for Development between India and Bangladesh (2011) – represent the style of bilateral

cooperation that has been commonplace in the Ganges Basin over the past 70 years and more.

Despite their bilateral nature, two of these agreements stand out for their potential ability to contribute to greater cooperation. The Ganges Water Sharing Treaty, 1996 is considered an advancement in water governance in the region for its attempted resolution of longstanding disputes at the India–Bangladesh border and its direct consideration of dry-season water use, a high priority for both countries, being downstream riparian states. However, it still focused largely on India's priorities, was informed by negotiations between India and Bangladesh only, and did not recognise the importance of hazards such as floods and droughts (Ghosh & Bandyopadhyay, 2020; Hanasz, 2014; Siddiqui et al., 2019). It was formalised in 1996 and intended to operate for 30 years, and hence its expiration in 2026 provides an opportunity for novel and innovative approaches to be considered.

Second, the Framework Agreement on Cooperation for Development between India and Bangladesh was created to envisage a future of mutually beneficial cooperation between the two countries in a wide variety of areas. The Framework Agreement demonstrates a change in perspective in comparison to other treaties, as it contains a much broader scope of objectives targeting direct mutual benefits for both nations. This is particularly evident in its Article 4, which references arrangements for cooperation related to energy generation, transmission, and distribution, and Article 5, which references scientific, educational, and cultural exchanges and cooperation between the two nations.

GEDSI and other cultural considerations

The Ganges is considered one of the holiest rivers in Asia. As a supposedly pure and cleansing body of water, it is commonly used for ritual bathing, and many Hindus believe that bathing in the Ganges River can purify the soul and wash away one's sins. It is also believed that its water can cure certain ailments.

This contrasts with the severe level of pollution observed in the Ganges' waters, caused by the sustained outfall of sewage into the river, open defecation, and unregulated industrialisation along the river's banks. The collision between cultural importance and the protection of human and

environmental health creates an ongoing struggle between the spiritual role of the river and the impacts of its poor ecological health.

Like other basins in the HKH region, the Ganges Basin is a highly masculinised space, with male-dominated discussions on river basin management. A key manifestation of this is often seen in discussions that focus on legal agreements and treaties, omitting issues of gender equity, social inclusion, and justice (Earle & Bazilli, 2013). ICIMOD's Hindu Kush Himalaya assessment: Mountains, climate change, sustainability and people clearly demonstrated that gender inequity persists in the region, and yet, data disaggregated by gender, class, caste, ethnicity, disability, and other aspects of marginalisation are rarely collected (Resurrección et al., 2019). Gender-based exclusion related to water supply services continue even in areas that are rapidly urbanising, although the nature of exclusion varies significantly between and within urban and rural areas (Bhattarai et al., 2021). Despite some recent progress in improving female representation through reservations, there remains a persistent form of gender-based exclusion that scholars have termed ‘participatory exclusion’ (Agarwal, 2001). One key factor behind this is that sectoral governance frameworks pay limited attention to structural inequalities that underpin gender norms and property ownership structures that overwhelmingly favour men. As a result, women continue to face barriers to genuine participation in public life, including domains of water governance. Despite an increasing trend of mainstreaming gender and social inclusion in the domains of water and development, there are relatively few female water professionals in the Ganges Basin.

Also common throughout the HKH region is the outmigration of men in search of economic opportunities, turning rural agriculture and related activities such as livestock rearing into a highly feminised sector, but with limited household level power-sharing with women over family assets (Bhattarai et al., 2021; Hans & Hegde, 2020; Resurrección et al., 2019; Siddiqui et al., 2019). Poor women and other disadvantaged groups are likely to become increasingly vulnerable to climate change-induced floods and droughts when intersecting inequalities and the social roots of vulnerability remain unaddressed (Sugden et al., 2014).



CHAPTER 2

Challenges for basin-scale management

HIGHLIGHTS

There are substantial data and knowledge gaps across the Ganges River Basin regarding nearly all aspects of social, economic, and environmental realities.

There is no multilateral agreement enabling basin-wide collaboration.

The complexity of water resources management in the Ganges River Basin warrants greater integration, with a distinct focus on climate resilience, through cooperation between riparian nations, communities, and international actors.

The scale and dynamics of the Ganges River Basin make it one of the most complex in the world. Competing interests among powerful national-level stakeholders, varied religious and cultural perspectives, substantial poverty, increasing population growth, and impacts on environmental and human health from a changing climate are all factors posing a challenge to basin-scale management. When changing socio-economic drivers converge with the projected impacts of climate change in the Ganges Basin, the vulnerability of women, the poor, indigenous, and other marginalised people is likely to increase, particularly given the limited support available to these groups from current policy and planning arrangements (Goodrich et al., 2019).

A vast basin with myriad complexities

The vast social, economic, and environmental diversity in the Ganges River Basin creates a dynamic, unpredictable, and complex system that we may never completely understand. The sheer size of the basin presents a barrier to cohesive governance, compounded by the complexities of gender, poverty, and social inequity. Climate change, increased population growth, urbanisation, and industrialisation make it even more difficult to manage (FAO, 2011; Goodrich et al., 2019; Resurrección et al., 2019, Srinivas et al., 2020). The combination of these factors underlines the difficulty of collective management and simultaneously reinforces the urgency with which it is required (Hanasz, 2017). Institutional fragmentation is rampant, often causing even well-founded efforts at collaboration to flounder. The basin's complexity results in stakeholders developing competing opinions and priorities, often resulting in mistrust, and the pursuit of conflicting objectives.

Data gaps

The availability of data and knowledge is an important element of any transboundary governance system. At present, there are substantial data and knowledge gaps across the Ganges River Basin, regarding nearly all aspects of social, economic, and environmental realities. There is, in particular, a notable gap in disaggregated information and data regarding the experiences of different genders, those with disabilities, indigenous communities, underprivileged

caste groups, and other marginalised peoples (Resurrección et al., 2019). The data on disability in relation to water management are almost non-existent. Addressing these inequalities is not just about increasing direct access to water but also developing actionable knowledge about how women and other marginalised populations can equitably share in the benefits of water-driven economic development.

At present, the tendency of governments to maintain private data regarding water resources, usage, and users (particularly in India) limits cooperation and results in counter-productive parallel work by multiple stakeholders (Luna Bharati, personal communication, 27 September 2022). Notably, simply increasing the volume of available data may not always aid cooperative governance. Any expanded collection of data is likely to be most effective when utilised by experts and converted into meaningful knowledge by robust institutions with deep connections to the wider community.

A history of bilateralism

There is no multilateral agreement enabling basin-wide collaboration. Over the past several decades, governance in the basin has focused on infrastructure projects and short-term goals, resulting in bilateral agreements of limited scope and effectiveness. They have failed to consider the full breadth of actors, countenance basin-wide cooperation, or be inclusive of marginalised peoples. The absence of a multilateral agreement has left countries to focus on domestic priorities with little consideration of the potential mutual benefits of greater cooperation. Actors across the region have for decades bought into the ‘zero sum game’ perspective, driving mistrust and a wariness toward collaboration. Further, interventions from external actors have typically involved short-term, Track II dialogue and been of limited effectiveness in motivating cooperation throughout the basin (Hanasz, 2017). The complexity of water resources management in the Ganges River Basin warrants greater integration, with a distinct focus on climate resilience, through cooperation between riparian nations, communities, and international actors that leverages the diversity of perspectives, skills, and information.





CHAPTER 3

Opportunities for enhanced basin-scale management

HIGHLIGHTS

A delinking of key basin-wide issues from the political sphere may encourage reconsideration at a scientific level to create space for collaboration and trust-building.

Given the diversity of perspectives and needs across the Ganges River Basin, climate change represents a unifying catalyst for collaboration between stakeholders across the basin.

It is important that the riparian countries of the Ganges unite and collaborate over common interests, including through ongoing knowledge sharing and relationship-building to support practical action on integrated river basin management.

Although enhanced governance and cooperation are significantly challenged in the Ganges River Basin, as articulated earlier in this report, there are opportunities for progress toward basin-scale management.

A new look at existing agreements

Despite a history of bilateral agreements, elements of the existing legal framework contain references to, or acknowledgement of, basin-scale issues and solutions. Looking anew at this framework may allow actors to shift the paradigm towards wider collaboration. For example, although the Framework Agreement on Cooperation for Development between India and Bangladesh only focuses on the relationship between these two countries, it references basin-scale issues such as climate change, energy, and the environment, and mentions ‘common basin management’ as a component of future cooperation. These inclusions present an opportunity for integrated river basin management to be presented as a realistic possibility (and even a notionally supported approach), while noting that broader multilateralism is still challenging to pursue and the general focus remains on infrastructure and short-term improvements.

Beyond this Framework Agreement, articles/clauses in the Kosi and Gandak agreements – especially the former – suggest that inland navigation is a common priority for stakeholders of the basin. The Mahakali Treaty, also between India and Nepal, contains openings for collaboration in its references to joint financing ventures and investment. These existing provisions, if considered freshly, could present opportunities to consider or promote wider cooperative management in support of regional climate resilience within the existing legal framework in the basin. Such opportunities are especially relevant as the Ganges Treaty approaches its expiration in 2026.

Using and sharing science to build trust

A strategic delinking of key issues in the basin from the basin-wide political system may create space for collaboration and trust-building and, ultimately, drive progress. As the politics of the region are complex and often stifle or prevent cooperation, the delinking of major issues from the political sphere and reconsidering them at a scientific level

may be helpful in some instances. As a regional expert and convening body, ICIMOD could be a valuable contributor to this process, serving as a link between the scientific and research community and the policy-making leadership across the HKH region. Similarly, an expansion of data collection and standardisation methods across borders may allow for increased transparency, provide opportunities for discussion and joint assessments, help to develop a more comprehensive understanding of the basin itself, and build trust among stakeholders. A science-driven approach to many of the ongoing issues in the basin could provide a new avenue for inputs from a wider variety of stakeholders – including scientific and academic institutions, local governments, and community-based organisations – beyond the federal governments and ministries of agriculture and irrigation that are more typically involved.

Further, there is positive momentum contributing to trust-building on the GEDSI front. In the upper reaches of some of the Ganges’ tributaries in Bhutan, community-level organisations are working to address poverty by developing programmes that direct compensation from downstream beneficiaries

in Bhutan to communities upstream for their environmental stewardship and ecosystem protection services. In China, civil society organisations are organising and providing greater insights into the specific access to, and usage of, water, sanitation, and hygiene by particular disadvantaged groups such as women, disabled people, and ethnic minorities (Wenling Wang, personal communication, 27 September 2022). In Bangladesh, cyclone shelters are being made safe and secure from a gender and disability perspective (Faruk et al., 2018), and components of these designs are being replicated in other cyclone-prone parts of the world.

Successful platforms that already exist include ICIMOD’s Koshi Disaster Risk Reduction Knowledge Hub (KDKH). Such platforms may be supported by international initiatives such as the new UNESCO Recommendation on Open Science. Organisations such as the World Meteorological Organization (WMO), and its Global Climate Observing System, may provide globally recognised tools that can be leveraged to promote collaboration throughout the basin. Additionally, improvements in data collection and modelling, driven by improved collaboration



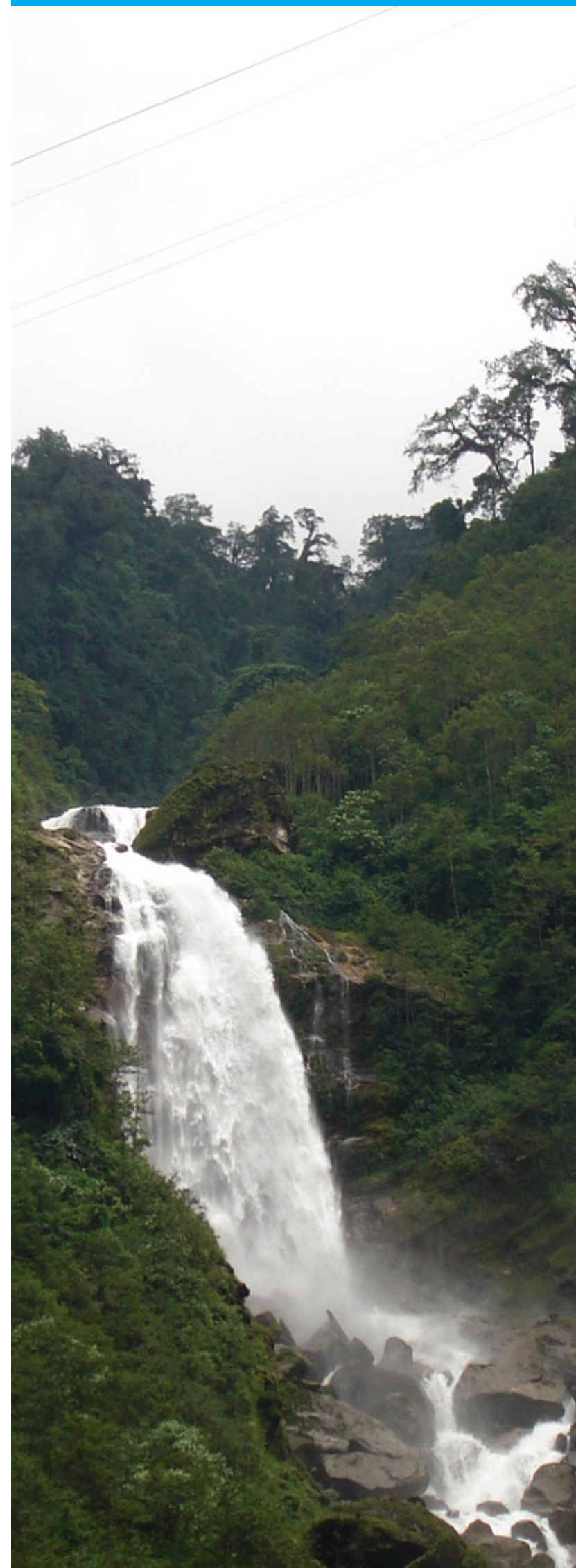
across the basin, should be directed towards early warning systems for disaster risk reduction. Some of this work has already been accomplished – for instance, ICIMOD and the WMO have implemented the regional HKH Hydrological Cycles Observation System (HKH-HYCOS). This occurred in two phases and successfully upgraded hydrometeorological stations and data sharing across four countries (Nepal, Bhutan, Bangladesh, and Pakistan) between 2012 and 2016. The sharing of data through this endeavour promoted a culture of cross-border information sharing and introduced countries to the benefits of using automatic and real-time hydrometeorological stations (Shrestha, 2016). Further expansion, or renewal, of this collaborative partnership would contribute substantially to enhanced data sharing and trust-building.

Finally, it is suggested that a collaborative ‘State of the Ganges’ report could help bring together various data and knowledge streams to promote positive solutions and progress for stakeholders across the basin. Shared issues on shared rivers will require shared knowledge to develop shared solutions.

Common interests could drive collaboration

Given the diversity of perspectives and needs across the Ganges River Basin, climate change represents a unifying catalyst for collaboration between stakeholders across the basin. Climatic changes will be experienced by all stakeholders on both a regional and local basis, affecting upstream and downstream riparian stakeholders differently but providing a common impetus for improved collaboration (Sadoff et al., 2013). Thus, common risks and interests such as flood management, hydropower generation and management, irrigation, and groundwater salinity management, and other potential goals such as inland navigation may provide springboards for collaboration among national stakeholders. For example, a variety of innovative solutions are available to support flood management: demarcation of flood zones, the introduction of wetland mitigation banking, and the encouragement of aquifer storage. If implemented, these may deliver significant benefits for multiple riparian stakeholders.

It is important that the riparian countries of the Ganges unite and collaborate over these common interests, including through ongoing knowledge sharing and relationship-building to support practical action on integrated river basin management. ICIMOD represents one critical actor that could support these engagements.



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About ICIMOD

The International Centre for Integrated Mountain Development (ICIMOD), based in Kathmandu, Nepal, is the leading institute for the study of the Hindu Kush Himalaya (HKH). An intergovernmental knowledge and development organisation with a focus on climate and environmental risks, green economies, and sustainable collective action, we have worked in our eight regional member countries – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – since our foundation.

Entering our 40th year, ICIMOD is perfectly positioned to support the transformative action required for the HKH to face the challenges of the escalating effects of climate change, pollution, water insecurity, increased disaster risk, biodiversity loss, and widespread socioeconomic changes. We seek to raise our ambition to support the required transformative action to step up our engagement through to 2030.

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