

Elevating river basin governance and cooperation in the HKH region

SUMMARY REPORT I

YARLUNG TSANGPO-SIANG-BRAHMAPUTRA-JAMUNA RIVER BASIN



A I T H E R

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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, the Yarlung Tsangpo-Siang-Brahmaputra-Jamuna (henceforth referred to in this report 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 Knowledge Exchange and Dialogue session on the Brahmaputra Basin, as well as interviews with experts who have substantial experience working in the basin. It documents the context and identifies challenges and opportunities in managing the water resources of the Brahmaputra 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 [Ganges](#) and [Indus river basins](#)

High-level recommendations

- 1. Use common goals and mutual gains as catalysts for bilateral, trilateral, and multilateral cooperation:** The four riparian countries – China, India, Bhutan, and Bangladesh – have shared goals around building climate resilience, flood disaster risk reduction, transboundary river navigation, and maintaining biodiversity within the river basin. While there are also varied disagreements between them, focusing on common goals may provide opportunities for mutual gains and stimulate cooperation by engaging the relevant stakeholders in bilateral, trilateral, and multilateral relationships across the basin.
- 2. Focus on building trust and increasing awareness of the economic, political, social, and environmental benefits of transboundary cooperation:** There are deep sensitivities within the Brahmaputra Basin that must be considered in attempts to stimulate transboundary cooperation. A focus on building trust between stakeholders will support increased motivation for pursuing transboundary cooperation and could be underpinned by increased awareness of the many economic, political, social, and environmental benefits that can be derived from this level of basin-wide collaboration.
- 3. Use existing bilateral cooperation as a platform for expansion:** Although basin-wide cooperation is yet to come to fruition, several positive examples of bilateral cooperation do exist – between China and India (in the form of data sharing), between India and Bangladesh (through data and water sharing, inland navigation, and trade), and between India and Bhutan (through collaborative development projects). Such bilateral cooperation may provide a critical platform for initial steps towards catalysing basin-wide cooperation.
- 4. Support and catalyse collaborative basin-wide assessments:** Drawing on the multi-disciplinary

and multi-faceted expertise that exists in the countries of the basin, there is a distinct possibility for collaborative assessments, covering multiple dimensions of basin dynamics, from hydrology to community livelihoods and water governance. ICIMOD’s experience coordinating regional assessments such as the 2019 The Hindu Kush Himalaya assessment is a valuable example of a practice of building common understanding.

- 5. Strengthen gender and social inclusion in knowledge generation, dialogues, planning, and cooperation from the local to basin scales:** Social marginalisation and climate change-induced vulnerabilities have led to entrenched forms of disadvantage and inequity. Therefore, it is crucial to support and strengthen the capacity of community groups, including networks of women, people with disabilities, Indigenous groups, the landless, and other marginalised populations, to collectively voice their concerns in local, national, and transboundary dialogues and cooperation.
- 6. Strengthen the capacity of the water and development sectors in South Asia:** A growing body of research shows that South Asian countries can strengthen sectoral capacities in water governance in the context of a changing climate and society. India’s north-eastern states, which are part of the Brahmaputra Basin, and Bangladesh could undertake integrated water resources management and climate-resilient basin-level planning, fully considering the issues faced by women, people with disabilities, and other marginalised populations.
- 7. Connect river basin governance to multilateral trade and investment fora:** Connecting river basin governance to multilateral trade and investment fora will be key to addressing current and future challenges and may enable countries with varied economic interests to identify potential areas of collaboration.



CHAPTER 1

The Brahmaputra River Basin: An overview

HIGHLIGHTS

At least 114 million people depend on the Brahmaputra River Basin for their water, electricity, food, agriculture, and fishing

The basin is one of the world’s most densely populated, and one of the most underdeveloped

It is the subject of the diverse, and sometimes conflicting, visions of national and state governments, local communities, and other stakeholders

The Brahmaputra River is known as the Yarlung Zangbo, Yarlung Tsangpo, or simply Tsangpo in the Tibet Autonomous Region (TAR), China, and Dehang or Siang in the state of Arunachal Pradesh in India. Further downstream, when the Siang flows into the state of Assam and meets the Dibang and Lohit rivers, the combined stream is known as the Brahmaputra River (Pangare et al., 2021). While its inclusive name is Yarlung Tsangpo-Siang-Brahmaputra-Jamuna, this report uses the name ‘Brahmaputra’ in short.

The river originates in the western part of the TAR, from Chemayungdung Glacier in the Kailash range (Pradhan et al., 2021). It is 2,880 kilometres (km) in length, and with a drainage area of 580,000 square kilometres (km²) across China, India, Bhutan, and Bangladesh (see Table 1). It heads eastward for 1,100 km, crosses deep Himalayan gorges into Arunachal Pradesh, and flows southwest for a 700-km stretch of floodplains and valleys in Assam. It is met by the Teesta River, a significant transboundary tributary of the Brahmaputra. The Teesta is 414 km in length (of which 121 km are in Bangladesh) and flows through the Indian states of Sikkim and West Bengal. The Brahmaputra then enters Bangladesh and ultimately flows into the world’s largest delta (Rudra 2018) (Figure 1).

General and physical characteristics

Discharging an average volume of approximately 20,000 cubic metres (m³) of water per second, the Brahmaputra is the largest river in South Asia and the fourth largest in the world in terms of annual discharge (Dutta et al., 2021; Mahanta et al. 2014). At least 114 million people depend on the river basin for their water, electricity, food, agriculture, and fishing (Engelke & Michel, 2019), and it includes parts of the world’s two most populous countries, China and India. The river accounts for nearly 30 per cent of India’s freshwater resources and about 40 per cent of its total hydropower potential (Zhang, 2016). For China, the river’s valley is the cradle of Tibetan civilisation and a vital resource for Tibetan agriculture and food security (Zhang, 2016) (Figure 2). More recently, China has begun to consider the river as the largest source of hydropower in the country.

FIGURE 1 MAP OF THE BRAHMAPUTRA RIVER BASIN



Source: A. Shrestha et al. (2015)

TABLE 1 GENERAL AND PHYSICAL CHARACTERISTICS OF THE BRAHMAPUTRA RIVER BASIN

Characteristic	Description
Origin (source area)	The great glacier mass of Chemayungdung in the Kailash range of southern Tibet at an elevation of 5,300 metres above mean sea level (masl)
Length	At least 2,880 km (1,625 km in China, 918 km in India, and 337 km in Bangladesh), although its length is debated throughout the literature
Total basin area	580,000 km ²
Basin countries (and share of total basin area)	China (50.5%), India (33.6%), Bangladesh (8.1%), Bhutan (7.8%)
Physiography	Tibetan Plateau, Himalayan belt, and floodplain
Climate	Four seasons – relatively dry, cool winter (December–February); dry, hot summer (March–May); southwest monsoon with predominant rainfall (June–September); and retreating monsoon (October–November)
Precipitation	Northern Tibet receives 10%–15% of the precipitation received in the southern aspect of the Himalaya in India (Ghosh & Bandyopadhyay, 2020). The Brahmaputra Valley in Assam (India) receives 2,293 mm of rainfall a year on average (Deka et al., 2013)
Flow	Average annual flow of 19,830 m ³ /s at its mouth, the fourth largest in the world
Water uses	Irrigation, water transport, hydroelectric power generation, livestock rearing, fishing, public water supply, industry, manufacturing, bathing, religious practices, tourism
Population	Approximately 114 million in 2013 – 58 million in Bangladesh, 39 million in India, 16 million in China, and 700,000 in Bhutan (Engelke & Michel, 2019)
GDP generated within the basin	No basin-specific data found

Socioeconomic trends

The Brahmaputra Basin is one of the world's most densely populated, and one of the most underdeveloped (Mahanta et al. 2014), both socioeconomically and in terms of its water resources. A growing demand for food, energy, and water is putting tremendous pressure on its water and riverine resources and biodiversity conservation areas (Hanasz, 2017; Pradhan et al., 2021). The river has the highest hydropower potential in the world, especially in the segment of the river crossing the Himalaya (Ray et al., 2015) in India's north-eastern region, including the states of Arunachal Pradesh, Assam, Nagaland, Meghalaya, and Sikkim. Bhutan and the Indian state of West Bengal also contribute to the basin's hydropower potential. The basin is the subject of the diverse, and sometimes conflicting, visions of national and state governments, local communities, and other stakeholders. At the governmental level, China and India aim to increase hydropower generation from the river (Engelke & Michel, 2019; Saikia, 2019), Bangladesh is considering an integrated Teesta development project with support from China (Rahaman, 2021), and most of the hydropower produced in Bhutan is with Indian collaboration and benefits both countries.

China's economic policy encourages diverting the flow of the Yarlung Tsangpo/Brahmaputra water to its dry, western region. It is also planning mega dams for hydropower generation. India too aims to build more dams for hydropower, not only for its national economic interests but also to address political instability in its north-eastern region and at the border with Bangladesh (Yasuda et al., 2018). There are also concerns that if the Brahmaputra were controlled and dammed upstream, it would adversely impact the livelihoods of millions in downstream India and Bangladesh (Fischer et al., 2017).

The Brahmaputra River is an integral part of the social and economic life of 114 million people in the basin. The population in India's north-eastern region is predominantly composed of Indigenous farming and fishing communities that are highly dependent on riverine ecosystems for fishing, agriculture, and tourism (Johnson et al., 2014).

The downstream communities in Assam and Bangladesh are heavily impacted by floods, siltation, and the erosion of agricultural land. River erosion leads to a significant loss of both agricultural land

and homesteads, resulting in both homelessness and landlessness. In the lower basin, the more vulnerable groups are in flood-prone areas and are severely impacted by recurrent floods and erosion (Mahanta & Das, 2017; South Asia Consortium for Interdisciplinary Water Resources Studies [SaciWATeRs], 2018). Many marginalised communities live on river islands, called chars. These groups face high levels of poverty, poor access to healthcare, education, and other services, and are very susceptible to floods and subsequent food insecurity (Hoque & Hazarika, 2020; B. Hossain et al., 2020).

Environmental characteristics and climate change impacts

The Brahmaputra Basin includes many outstanding environmental features. With a depth of 6,009 metres, the Yarlung Tsangpo Grand Canyon in Tibet is the deepest canyon in the world. Originating at 5,300 metres above mean sea level (masl) and flowing at 3,500 masl through Tibet, the Yarlung Tsangpo is the highest navigable river in the world. It is third, behind the Amazon and Yellow rivers, in the transport of sediments, with some sediments deposited in the river channels and banks of the floodplain of Assam, and some carried further downstream and deposited in the Bengal Delta, the largest delta in the world. Majuli, in Assam, is the largest riverine island in the world. In addition, the basin is a part of two biodiversity hotspots – the Himalaya and the Indo-Burma – which are two of 36 biodiversity hotspots in the world (Pradhan et al., 2021). Further, it includes one of the world's oldest human migration routes, from Africa to the Far East.

Climate change, combined with dams and development work, is likely to escalate flooding as well as droughts, especially in the lower basin. Winter rainfall is expected to decrease, and monsoonal rain is expected to increase under climate change projections (Dutta et al., 2021; Mahanta et al. 2014). Across the Himalayan part of the basin, a 5–25 per cent increase in summer rainfall (that is, during the pre-monsoon months of March, April, and May) is projected by 2050 (A. Shrestha et al., 2015). However, while there is an expected general trend of rising monsoonal rainfall in the basin, the trend is not homogeneous. In north-eastern India, covering about 31 per cent of the Brahmaputra River Basin, a

significant declining trend in the southwest monsoon rainfall (June–September) has been observed over the last three to four decades (Kothawale & Rajeevan, 2017). Glacier melt rates are expected to rise, and glacial run-off will decline after it peaks (Nie et al., 2021). The Upper Brahmaputra is likely to be impacted mostly by glacier melt due to climate change (Palash et al., 2023).

Bangladesh is already experiencing reduced dry-season flows, attributed to climate change and upstream development (Baten & Titumir, 2016), which is hampering groundwater recharge, fisheries, and irrigation across the country (Rahaman et al., 2020). Notably, there is currently no major water diversion in the Brahmaputra River Basin, with almost all dams being 'run-of-the-river' projects, which do not store or divert water from the channel or the basin/sub-basins. The Teesta Barrage in West Bengal does transfer a part of the flow of the Teesta to nearby areas for irrigation. The demand for water during the dry season is increasing and likely to grow across the lower basin in India and Bangladesh, with the projected impacts of climate change and upstream dam construction likely to further reduce dry season flows in Bangladesh (Gain & Giupponi, 2015). When changing socioeconomic drivers converge with the projected impacts of climate change in the region, the vulnerability of women, poor, indigenous, and other marginalised people is likely to escalate, especially given the current policy environment (Goodrich et al., 2019). Floodplain communities living in sandbar islands or chars will be particularly vulnerable (B. Hossain et al., 2020).

The lower basin (particularly Assam and Bangladesh) suffers from flooding during the monsoon season, which impacts human lives, agriculture, and settlements. Over 50 million hectares were affected by cumulative flood damage in the basin between 1953 and 2016 (Prasad, 2021). In Assam, 30 per cent of the river valley is inundated by floods every year (Roy & Pandey, 2017). In a study of 476 households in Assam, 83 per cent were found to have become poorer due to floods (Mahanta & Das, 2017). Such risks are disproportionately high among women, tribal/Indigenous communities, and other vulnerable groups (Chetry, 2022). In Bangladesh, the problem of flooding is particularly acute during the monsoon (Rudra 2018). Floods do, however, replenish nutrients for fisheries and agriculture in the lower Brahmaputra Basin.

With increasing development, water pollution levels have increased. Industrial and household pollution and waste management negatively impact water quality, affecting coastal and terrestrial ecosystems (Pangare et al., 2021).

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

There is no basin-scale system of governance or cooperation on water management for the Brahmaputra Basin. None of the Brahmaputra's riparian countries are party to the United Nations' Convention on the Law of the Non-Navigational Uses of International Watercourses (UN Watercourses Convention). Mistrust among the riparian countries of the basin is high (Hanasz, 2017) and a high degree of power asymmetry exists among these countries. Most negotiations and collaborative activities have been sporadic and limited in scope. Researchers on basin governance consider negotiations for a basin-wide treaty a non-starter (Barua, 2018). In some situations, both China and India appear to prefer to operate under bilateral rather than multilateral agreements. The UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes is seen as overemphasising the responsibility of upstream countries for downstream impacts (Zhang, 2016) and thus has influenced transboundary cooperation only to a limited degree.

On the positive side, there are examples of bilateral cooperation, such as between China and India on data sharing, the establishment and operation of several hydropower projects between India and Bhutan, and conversations regarding risk management between India and Bangladesh. Ongoing bilateral cooperation between India and Bangladesh regarding inland water transport and navigation in the Brahmaputra River Basin with mutual benefits for trade and commerce between the two countries is also an important positive development in recent times.

In the absence of basin-wide cooperation, development actions in the basin may lead to negative consequences. Samaranayake et al. (2016) found that China and India, the upper riparian countries, are more concerned about the basin "in political terms" (that is, its economic and strategic benefits), whereas Bangladesh, the lowest riparian, is primarily

concerned with the basin in “physical terms” (for example, livelihoods and flood resilience), although there is variation among localities within countries as to how the issues and opportunities concerning the basin should be prioritised. They felt that, given that there are no international or water-related crises at present, it was an opportune moment for China, India, and Bangladesh to cooperate to prevent future problems, noting that focusing on the shared interests of the three countries – such as economic integration, flood control, and ecological and biodiversity conservation across the basin – would be more effective for multilateral cooperation than focusing on the “narrow lens” of water sharing and hydropower dam building.

China has three dams planned along the Yarlung Tsangpo (Upper Brahmaputra), which may mean that India’s hydropower projects would not remain viable during the dry seasons (Vij, 2020). While the real, as opposed to perceived, impacts of any Chinese plans for hydropower development or diversion of streamflow are not yet clear, it is important to note that only 35 per cent of the Brahmaputra’s average annual streamflow currently originates in Tibet (Mahanta et al., 2014). India’s stakes in hydropower development in its north-eastern region are high as they are crucial for political as much as economic reasons. It has built power utilities in this region as a part of its efforts to make the region India’s ‘power plant’ (Zhang, 2016).

Water governance is characterised by hybrid formal–informal regimes, with synergy and support between governmental institutions and informal institutions often lacking, and scant research on the institutional aspects of river systems governance in the Ganges-Brahmaputra-Meghna basin (Ghosh & Bandyopadhyay, 2020).

The different levels of responsibility for water in each country – water is the responsibility of the central governments in China, Bhutan, and Bangladesh, but largely under the jurisdiction of individual states in India – causes imbalances in dialogue between countries. For example, India’s plans for constructing hydropower infrastructure on the Brahmaputra are challenged by internal differences between the states of Assam and Arunachal Pradesh, further complicating international dialogue on associated issues. Assam’s opposition to the plans to construct hydropower dams in Arunachal Pradesh, including

the fear of flooding, resulted in the need for attention to dialogue and discussions within India as one of the key dialogue processes for the Brahmaputra (Yasuda et al., 2018). Cooperation between India’s six basin states – Arunachal Pradesh, Assam, West Bengal, Meghalaya, Nagaland, and Sikkim – remains inadequate to harness opportunities and tackle challenges such as floods. While mechanisms for dialogue between the Indian states exist, such as the Brahmaputra Board established by the national government, they have not been able to resolve these challenges thus far.

Over the past decade, there have been many dialogues on the Brahmaputra, led by civil society organisations, academics, and others. For example, the Brahmaputra Dialogue – established in 2013 by researchers in India and Bangladesh and led by SaciWATERS and the Indian Institute of Technology, Guwahati, and with support from The Asia Foundation – has grown from a bilateral initiative into a multilateral platform involving all the basin countries. The dialogue showed how multiple diplomacy tracks could support basin-wide cooperation. It led to increased engagement in some areas of common interest, such as flood management and inland navigation, and established a potential platform for further joint activities. However, some scholars closely monitoring these dialogues are of the view that they have had limited reach and impact, as they focused on engaging individuals at the national level and academia, but with poor links to local communities. The lack of engagement with local communities restricts research and the flow of information, and this continues to be a major constraint to effective basin-level planning.

GEDSI and other cultural considerations

The basin’s socio-cultural dimensions are as diverse and complex as its geographical and physical dimensions. The river flows through a region with three major faiths – Buddhism, Hinduism, and Islam – as well as many local customs and practices, and has supported the growth of civilisations in both Tibet and north-eastern India, referred to by some scholars as the ‘Brahmaputra Civilisation’. The rich and diverse cultures, traditions, languages, and customs of people living in the basin have been shaped by the river.

Traditional weather forecasting continues to be done by Indigenous communities to help cope with, and adapt to weather-related risks (Balehegn et al., 2019). Predicting the weather by observing the sky, clouds, and wind direction, and gauging the possibility of floods by observing rivers and clouds, is an important element of the traditional knowledge of Indigenous communities and which helps them cope with floods and other weather-related risks. Local communities also rely on other age-old practices of risk prediction and response, such as interpreting animal behaviour to predict floods, raising homesteads, constructing ponds to store water for the dry season, and mixed cropping. Hence, livelihoods and culture here are uniquely linked to risks and opportunities created by the dynamics of water and the environment.

Many marginalised communities in the lower basin live on river islands. Land erosion is a bigger disaster than floods in these chars, since it takes away valuable land and forces people to migrate (Das & Khanduri, 2021). Protecting these vulnerable people from the dangerous effects of erosion, floods, and water insecurity, as well as maintaining the highly biodiverse ecosystems in the lower basin, is both a challenge and an urgent priority.

The situation in the Brahmaputra Basin is no different from those in transboundary basins globally, where gender disparities persist in water resources governance and diplomacy, with men dominating decision-making at different scales (Offutt, 2020). The sector’s male-dominated nature is further highlighted by the underrepresentation of women in water science, knowledge, planning, and implementation (G. Shrestha et al., 2019).

Even though women do much of the work relating to water across the HKH region, institutional analysis and governance assessments of water are disconnected from ground realities and predominantly presented as if only men mattered (Ahmed & Zwarteveen, 2012; SaciWATERS, 2018). Currently, the number of women working in the water management sector in the region is very low, partly due to work environments that maintain a culture of hierarchy and subordination, which inherently promotes male-dominant, hegemonic attitudes and practices. This makes it difficult for women to participate and establish themselves as key contributors within the water sector (G. Shrestha et al., 2019). Further, the lack of disaggregated data

pertaining to gender, class, caste, ethnicity, disability, and marginalised groups impedes the development of a more comprehensive understanding of this situation, leading to the perpetuation of inequities (Resurrección et al., 2019). The state of participation and the voices of people with disabilities and related issues appear largely absent in the literature. The lack of proper documentation of the ongoing efforts of marginalised peoples involved in water management domains and the problems faced by them remains a pertinent issue.

While local-level gender analysis is emerging from the lower basin (Leya et al., 2020), basin-wide gender analysis is lacking (Lexén, 2017). Gendered dimensions of water governance are not well documented, with limited data available on how, and to what extent the voices of women, Indigenous people, and other disadvantaged populations are articulated in different contexts and practices of water governance. In discussions around transboundary rivers, there is an overemphasis on the hydrological dynamics of the river, which often overlooks the uneven and contested social realities surrounding it. Despite the undeniable relevance of gender in any water-related engagement, this aspect is noticeably absent from dialogues within civil society across national and provincial borders (SaciWATERS, 2018). Even in scholarly and policy discussions, the focus is on intergovernmental cooperation and diplomacy, with limited attention paid to issues of social inclusion and justice (Earle & Bazilli, 2013). Despite growing research efforts from academia to understand community-level dynamics, the evidence and analysis is often only partial and purely driven by academic objectives. In addition, non-governmental organisations have recently undertaken well-considered community-level interventions involving women and other marginalised communities, but the knowledge generated from these engagements is largely absent from the literature as these initiatives are usually not reported or published.

Like in other river basins in the HKH region, little is being done to understand and address the problems that women, Indigenous people, and other marginalised groups face from current water management practices and policies, and more importantly, from the lack of basin-wide management. Power asymmetry is a problem not just at the transboundary basin level but also at the sub-national and local community levels.



CHAPTER 2

Challenges for basin-scale management

HIGHLIGHTS

Governments prioritise their own jurisdictional challenges and opportunities, and the benefits of transboundary cooperative management may be absent in national policies and priorities

There is a view that gains in water security for one country must result in losses in water security for the other

Continuous free flow of data can promote transparency and reduce mistrust among the countries, as it is regarded as a sign of cooperation

Valuing basin-wide planning and governance

Upstream–downstream interdependencies necessitate the development of collaboration between the riparian countries (Rasul, 2014). However, there is still only limited appreciation of basin-wide planning and governance among the countries of the Brahmaputra Basin. Over the past decade, academic and civil society groups have tried to highlight the need to move beyond country- or province-specific thinking and action in the basin, but governments still seem to undervalue the benefits of basin-wide governance. Governments naturally prioritise their own jurisdictional challenges and opportunities, and the benefits of transboundary cooperative management may be absent or, at best, not prominent in national policies and priorities. There is often also limited knowledge exchange and learning from other relevant basins. For example, there are opportunities for learning from the Mekong Basin, which has made significant advances in valuing and improving transboundary basin governance. One of the key lessons identified during the July 2022 Brahmaputra Knowledge Exchange and Dialogue session was the need for establishing mechanisms for collaboration between neighbours with the aim to share knowledge, connect communities, and build trust, but it takes time. In the Mekong Basin, the documentation of good intentions, the establishment of a shared mandate, and mechanisms for cooperation were followed by significant financial support towards capacity-building for the collaborative management of the shared basin.

Strengthening management and institutional capacities

Capacities for integrated river basin management at the national and sub-national levels are limited, particularly given the scale of the Brahmaputra Basin and current and future challenges. Currently, the focus is on specific risks (such as floods) and opportunities (such as hydropower generation), without considering the basin-wide social–hydrological system. International development partners have channelled investments into social and environmental aspects, but investment in integrated basin-scale programming remains low. Institutional arrangements for cooperation between states in

India’s North-east also do not appear adequate to foster upstream–downstream coordination and cooperation, despite the constitutional power of individual states to govern water.

Although civil society organisations, media organisations, and academic groups have challenged the prevailing top-down and hydraulic model of water management, water stakeholders need a better understanding of local-level social–hydrological dynamics and water governance issues and their linkages with regional processes and shared water governance challenges to contribute more fully (International Union for Conservation of Nature [IUCN], 2018: 16; Rasul et al., 2021). The capacities of relevant civil society organisations need to be strengthened for local and regional basin governance and to avoid the problems of asymmetric cooperation, for example, resulting from an imbalance in negotiating capabilities. Although research shows that coping and adaptation capacities are linked to intersecting social differences within and between communities and households (Goodrich et al., 2019), mechanisms for listening to and safeguarding the voices and concerns of women, people with disabilities, Indigenous people, and other marginalised populations are poorly developed.

Basin-wide research, monitoring, and data sharing

The Brahmaputra has received relatively less attention from global and national scholars in terms of research and knowledge production compared to the Indus, Ganges, and other comparable river systems of the world. Das (2014) argues that “... the existence of a comprehensive and holistic knowledge base on the river and its basin, encompassing all important aspects of the physical, biological, environmental, and socioeconomic regimes, is a precondition to fully exploiting the benefits” of a basin-wide cooperation agreement.

Over the past decade, the academic literature is growing on the hydromorphology, biodiversity, cultural history, social development, livelihoods, resource utilisation, hydroclimatology, water governance, climate change, and management of the basin. However, studies have typically focused on only one or the other part of the river or basin, and

usually from one perspective. Despite the existence of research institutions in all the riparian countries, there is a notable lack of a whole-of-basin perspective in research and data collection (Pangare et al., 2021).

The Chinese and Bangladeshi parts of the basin are more researched than the Indian part, with one reason being the lack of availability of or access to data in India due to government restrictions. However, although Chinese researchers have carried out comprehensive work on the geophysical, climatic, ecological, and environmental aspects of the basin, their research is not easily accessible because it is not in the public domain or not available in English (Das, 2014).

Climate monitoring in the region is inadequate, creating many uncertainties, particularly in high-altitude areas (Krishnan et al., 2019). There is a lack of data disaggregated by gender, disability, poverty and landlessness, and Indigenous group membership. In general, secrecy around hydrological data and water knowledge remains a constraint (Barua et al., 2019).

There is no basin-wide system of data sharing or flood warning. China and India have two MoUs, signed in 2002, whereby China agreed to provide seasonal water flow data on the Yarlung Tsangpo to India, and India pays China for the data. These agreements help facilitate advance warning for floods during the summer monsoon period, but the flow data for the dry season are not shared.

Whereas the research and knowledge dissemination by researchers and civil society organisations has increased in recent years, experts believe that governments in all countries of the basin have not actively contributed much to support knowledge creation and dissemination. Informal multi-country research networks have evolved, but their work is severely hampered by the lack of funding for basin-wide research activities. As a result, there is a lack of basin-wide knowledge generation and data sharing, a significant limitation to furthering basin-wide management of the Brahmaputra.

There is a need for continuous data sharing, including both monsoon and dry season data, among all four riparian countries. Continuous free flow of data can promote transparency and reduce mistrust among the countries, as it is regarded as a sign of cooperation.



Basin-wide cooperation and trust-building

The basin's governments are focused on harnessing the energy potential of the Brahmaputra through hydropower development, with two bilateral investments being particularly significant. India is investing in Bhutan's hydropower development, and China is considering supporting the Teesta River Comprehensive Management and Restoration Project (TRCMRP) in Bangladesh. There are also ongoing unresolved disputes. For example, India and Bangladesh have a long-standing dispute over India's dam building on the Teesta, which adversely impacts water flows into Bangladesh. On the other hand, recent developments in cooperation between these two countries have led to mutual gains in inland navigation. Ideally, the consideration of these issues would be taking place within a cooperative, basin-wide governance system, but that is currently not the case for the Brahmaputra.

Two main areas of concern around international conflict over the Brahmaputra have been identified. First, the lack of formal basin-wide river management institutions and agreements, with difficulties in expanding the limited fora that do exist. Second, the reduction of the areas available for negotiation between the world's two most populous countries is creating a view that gains in water security for one country must result in losses in water security for the other (Engelke & Michel, 2019). There does not appear to be a strong perception that the countries can benefit mutually.

The interactions over water resources between India and Bhutan, on the other hand, have been largely positive. The cooperative relationship between the two countries over water resources (the smaller tributaries of the Brahmaputra River) can be attributed in large part to Bhutan's farsightedness and political savvy in fostering non-zero-sum thinking

that furthers the interests of both countries through hydropower development (Hanasz, 2017). However, the India–Bhutan model of bilateral cooperation management is less likely to be replicable between the other countries with different types/levels of power relations.

Flood control

Due to the highly braided form of the lower reaches of the river, with a channel width of up to 10 km, it is prone to flooding and continuous erosion at its banks. An average of 8,000 hectares are lost to erosion each year, reducing the overall productive capacity of the floodplain, and resulting in increased landlessness. This results in forced migration to less flood-prone zones, and an increasing encroachment of nearby national park areas (SaciWATERS, 2016).

Several embankments stretching for thousands of kilometres have been built to control floods, particularly in Assam and Bangladesh (Haque & Nicholls, 2018; Wasson et al., 2020). However, in most cases, the embankments have not been successful; breaches are very common due to poor design, planning, implementation, and faulty construction (Das, 2017; Z. Hossain et al., 2008; Wasson et al., 2020). The regular occurrence of embankment failures during monsoons and extreme weather events such as cyclones and storms indicate the need for stronger and higher embankments. However, new embankments are constructed, and the old ones repaired and strengthened, only for them to be washed away again (Gupta & Bhimwal, 2020). With governments focused on hydropower development, there seems to be limited understanding of the need for increased efforts and funding towards flood resilience.



CHAPTER 3

Opportunities for enhanced basin- scale management

HIGHLIGHTS

The countries of the Brahmaputra Basin have common humanitarian, environmental, and development goals

They share concerns around building climate resilience, reducing flood disaster risks, improving river navigation, and protecting the environment for all common and shared needs

This presents a unique opportunity for a more cohesive approach to river basin governance in the Brahmaputra

Basin-wide dialogues and networks

Over the past two decades, several institutions and consortiums have made significant efforts towards addressing the challenges of research, advocacy, awareness, and public diplomacy in the Brahmaputra River Basin. These include ICIMOD, the Brahmaputra Dialogue, Third Pole-China Dialogue, the Ecosystem for Life project of the International Union for Conservation of Nature (IUCN), the LIFE-BELA (Lawyers Initiative for Forest and Environment and Bangladesh Environmental Lawyers Association) initiative on the Teesta River, and the Asia Foundation's intervention through its Civil Society Fund. Other organisations have been engaged more in transboundary dialogue, conflict resolution, and other trust-building measures, which some refer to as track 2, track 2.5, and track 3 diplomatic approaches. All these initiatives have contributed to raising the importance of transboundary water governance for governments and people in the basin. Importantly, each of these networks and initiatives can be rejuvenated, cross-fertilised, and strengthened for future contributions.

ICIMOD has undertaken extensive assessments of regional environmental issues, facilitated policy dialogues, and supported water management initiatives in the Brahmaputra Basin. ICIMOD's [Hindu Kush Himalaya assessment](#) (Wester et al., 2019), together with the lessons drawn from additional initiatives, provides a strong basis for a basin-focused assessment and more policy dialogues. The Hindu Kush Himalaya assessment and the resulting [HKH Call to Action](#) reflect five years of research, review, and analysis. The HKH Call to Action has been developed as a roadmap based on the key findings of the Hindu Kush Himalaya assessment report. It articulates six urgent actions, including an emphasis on cooperation at all levels across the region, concerted climate action, sharing of regional data and information, and science and knowledge cooperation. [ICIMOD's 2023–2030 Strategic Plan](#) has further reaffirmed its mandate for transboundary risk reduction in the HKH region. Under its 2023–2030 Strategic Plan, ICIMOD aims to expand basin-wide activities in the Brahmaputra, building on experiences in the Indus and Koshi basins.

The potential for basin-wide collaborative research has been well recognised. The Brahmaputra Dialogue identified several actionable options for enhancing

basin-wide cooperation, including academic exchanges, joint research proposals, joint workshops and conferences, joint publications, civil society meetings, interactions with the media, and dialogues with science journalists. Stakeholders from the four riparian countries have suggested that such an opportunity for dialogue “definitely helps to ease the tension between multiple stakeholders and develop trust” (Barua & Viji, 2018).

There is an opportunity to build upon existing platforms and networks. This might occur through reinvigorating or remodelling the Brahmaputra Dialogue, or by adapting the Hindu Kush Himalaya assessment report to focus on a basin-wide collaborative assessment. Alternatively, creating a new forum (or fora) for cooperation and progress on river basin governance in the Brahmaputra Basin may be an effective means of engaging all relevant stakeholders and catalysing dialogue. In any case, future attempts at dialogue should enable the participation of women, people with disabilities, indigenous people, and other marginalised populations to properly understand on-the-ground realities for effective basin-wide cooperation.

Supporting community-level transboundary interactions can help strengthen common voices of disadvantaged people across borders, such as those living on the floodplain throughout the river system. This can promote community-to-community dialogues, knowledge sharing, and understanding about the river and of the different ways communities and individuals are adapting to the old and new challenges they face. Building a wider network of local and indigenous communities will help build their adaptive capacity and ability to influence projects that need to consider the downstream impacts on people and the environment. Building new networks of female water professionals, and supporting emerging ones, to undertake GEDSI-focused work can help overcome the male domination in the water governance space.

Internationally supported actions should harness the benefits of multiple interventions, including applied hydrological, climate resilience, and political economy research, through a focus on facilitating dialogues, building capacities for basin-level planning and governance, and empowering women, local communities, and marginalised groups.

Mutual gains in areas of common interest

Focusing on mutual gains can help advance basin-scale cooperation. This cooperation will benefit national economies, increase resilience, and support local livelihoods. An example of such a mutually beneficial arrangement would be upstream hydropower generation in China and Bhutan on the one hand and downstream transport and trade routes in India and Bangladesh on the other. The 891-km stretch of the river from the Bangladesh–Assam border in the west to Sadiya, in Assam's Tinsukia district in the east presents an opportunity for increased cooperation through the waterways' connectivity and offers ample scope for cooperation during the monsoon and/or post-monsoon seasons (Ghosh & Bandyopadhyay, 2020).

The countries of the Brahmaputra Basin have common humanitarian, environmental, and development goals, such as protecting lives and livelihoods, maintaining biodiversity and functional integrity, and enabling sustainable development. In recent years, shared concerns have been more explicitly around building climate resilience, reducing flood disaster risks, improving river navigation, and protecting the environment for all common and shared needs for what is still a largely ‘undeveloped’ river. This presents a unique opportunity for a more cohesive approach to river basin governance in the Brahmaputra.

Potential for expanding bilateral cooperation

Formal basin-level cooperation requires trust and confidence among and within countries of the basin; however, a lack of trust remains a constraint to developing river basin governance. Nevertheless, there is some level of data sharing taking place between the two largest and most powerful countries of the basin, China and India, as well as Bangladesh, even if they are largely bilateral in nature.

India and Bangladesh have a functioning ministerial-level collaboration, known as the Joint Rivers Commission (JRC), which was established in 1972. India and Bangladesh share 54 rivers, of which seven have previously been identified by the JRC as priorities for developing a framework for water sharing agreements. River data exchange is an

important area of cooperation between the two countries. In 2022, the JRC agreed to widen the scope of cooperation by including another eight rivers in data exchange and extending the timeframe for real-time data sharing beyond 15 October, to help Bangladesh address unforeseen flood events (Ministry of Jal Shakti, 2022).

Ongoing cooperation between India and Bhutan in the hydropower sector takes place through the 2006 Agreement on Cooperation in Hydropower and the subsequent Protocol to the 2006 agreement signed in March 2009. Through these agreements, Bhutan receives financial and technical support from India to develop 10,000 megawatts (MW) of hydropower capacity, while India agrees to import the surplus electricity from Bhutan (Premkumar, 2016).

There is a strong need for a coordinated regional effort to improve hydrometeorological monitoring in the region, augment data sharing among institutions, and implement innovative ways of combining in-situ measurements, and remote sensing and modelling approaches to fill the data gaps (A. Shrestha et al., 2015). A continuous, free flow of data can promote transparency and reduce mistrust among countries and can also be regarded as a sign of and commitment to cooperation.

Further, while research shows that coping and adaptation capacities are linked to intersecting social differences within and between communities and households (Goodrich et al., 2019), mechanisms for listening to, and safeguarding the voices and concerns of women, people with disabilities, indigenous people, and other marginalised populations are poorly developed. There is potential to bring together emerging studies on intersectional vulnerability to inform policy dialogues at national and transboundary scales.

Bilateral and multilateral research and information sharing to inform areas of mutual interest may provide a way to demonstrate the benefits of enhanced cooperation, laying a platform for discussions on the more difficult governance challenges to be progressively explored. Because issues like water sharing and water diversion have proven to be problematic, often constraining the participation of governments in dialogues, topics

such as cooperation in inland navigation, disaster risk reduction, climate change mitigation and adaptation, biodiversity conservation, agriculture, fisheries, and groundwater may provide better entry points for dialogue and discussion. Emphasising the need for integrated river basin management from a scientific perspective, while highlighting climate change, water, energy, and food security and the nexus between them may prove to be useful starting points for the next phase of collaboration between riparian countries of the Brahmaputra Basin.

Multilateral trade and investment fora

The growing river trade and commerce industry has emerged as an important sphere of collaboration, generating mutual economic benefits to the basin countries. Multilateral river trade and investment fora already exist, covering all the riparian countries of the Brahmaputra. These have the potential to catalyse cooperation for enhancing river basin governance. Multilateral trade between all the riparian countries can open the door for discussions over a wider set of issues, broadening the opportunities for multilateral hydro-diplomatic engagement and help break the current impasse caused by the focus on bilateral discussions (Engelke & Michel, 2019). The Bangladesh–China–India–Myanmar Forum for Regional Cooperation is one example. This and other similar fora may create a desire for greater economic integration, supporting cross-sectoral and basin-wide collaboration among Brahmaputra’s stakeholders (Yasuda et al., 2018).

Connecting hydro-diplomacy to the emerging multilateral fora can help riparian countries overcome issues of mistrust and facilitate international negotiations with a focus on common areas of interest, such as flood risk management, community resilience, inland navigation, ecosystem services, and biodiversity protection. This approach could help desecuritize the agenda and increase the focus on trust-building, transnational approaches, and multilateralism, and enhance awareness of the multiple and competing trade-offs in the management of the river (Engelke & Michel, 2019). It could also help demonstrate the benefits of collaboration on river basin governance, and the costs of not doing so.



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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.

REGIONAL MEMBER COUNTRIES





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