

BRAHMAPUTRA

Approximately 114 million people depend on the Brahmaputra River basin for water, electricity, food, agriculture and fishing: 58 million in Bangladesh, 39 million India, 16 million in China and 700,000 in Bhutan.

It is one of the world's most densely populated, and least developed zones, and it spans two of the world's 36 biodiversity hotspots.

The river is 2,880km in length, and just over half of the basin (50.5%) lies in China, 33.6% in India; 8.1% in Bangladesh and 7.8% in Bhutan. It accounts for 30% of India's freshwater sources.

Rising demand for food, energy, and water in the basin countries is putting pressure on the river's water resources and biodiversity conservation areas.

It is the largest river in South Asia, and has the fourth largest annual flow in the world at its mouth.

It has the highest hydropower potential in the world, potential that both China and India aim to tap.

But dams and development work, plus climate change, are likely to escalate flooding as well as droughts, especially in the lower basin. China's economic policy encourages diverting water to its dry western region.

Bangladesh is already experiencing **reduced dry-season flows** due to climate and upstream development – impacting groundwater recharge, fisheries, and irrigation. These dry season flows are projected to reduce further, while demand for water, already rising, is likely to grow further.

Floods repeatedly hit the lower basin, especially Assam and Bangladesh – killing people, ruining crops, and destroying homes. For many, **land erosion**, is a bigger disaster than floods. An average of 8,000 hectares are lost to erosion each year, reducing the overall productive capacity of the floodplain and resulting in homelessness and landlessness among communities that face high levels of poverty, poor access to health, education, food insecurity, and other services. For some, the answer is forced migration to less flood-prone zones and an encroachment into nearby national park areas

These trends compound the vulnerability of women, poor, Indigenous and other marginalised groups, with floodplain communities on sandbars or chars (river islands) particularly vulnerable.

Several forms of cooperation around data sharing, opportunity-specific bilateral cooperation, transboundary research networks and civil society activity, and the presence of ICIMOD itself as a regional inter-governmental organisation all present important opportunities for initiating basin wide cooperation, albeit gradually and cautiously to build trust and then demonstrate the benefits of cooperation verses costs of non-cooperation.

Collaboration among riparian countries is urgent, and protecting vulnerable communities 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.

Climate change

Climate projections are not unambiguous but have also sent clear messages. The Upper Brahmaputra is likely to be impacted mostly by glacier melt due to climate change. Glacier melt rates are expected to rise, and glacial run-off will decline after it peaks.

Winter rainfall is expected to decrease, and (March, April, May) summer monsoon rain is expected to increase by 5–25% by 2050, while in NE India (31% of the basin) there's been a marked downward trend in June-Sept southwest monsoon rain.

Basin geography

The river originates in the western part of the Tibetan Autonomous Region, from Chemayungdung Glacier in the Kailash range and runs through the deepest canyon in the world.

It crosses China, India, Bhutan, and Bangladesh, meeting its tributary the Teesta river before flowing into the world's largest delta.

The Yarlung Tsampo is among the highest navigable river in the world and is third to the Amazon and Yellow rivers in the transport of sediments. While floods replenish nutrients for fishing and agriculture, ecosystems are being hit by household and industrial pollution.

The river passes through narrow gorges in the Himalayan range, where its decent creates immense opportunity for hydropower. Downstream, the river channel can be 10km wide.

Civilisation/GEDSI

The rich and diverse cultures, traditions, languages, and customs of people living in the basin – which span three major faiths , Buddhism, Hinduism, Islam – have been shaped by the river and livelihoods and culture here are uniquely linked to risks and opportunities created by the dynamics of water and the environment.

Solution points:

We need a transformative approach to change to bring system-wide change in GEDSI. For about 4 decades we have used incremental approaches to change which is slow and less effective.

The river's valley is the cradle of Tibetan civilisation and a vital resource for Tibetan agriculture and food security.

Communities in India's north-east are predominantly Indigenous farming and fishing communities that are highly dependent on riverine ecosystems for fishing, agriculture, and tourism.

In common with other river basins in the 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, nor to harness Indigenous and local knowledge systems.

Energy

China and India aim to increase hydropower generation (dams) from the river (India for economic interests and to address instability in its north-east region and at the border with Bangladesh). Bangladesh is considering a Teesta development project supported by China, most hydro produced in Bhutan is supported by India and benefits both countries.

It represents 40% of India's hydropower potential and is central to the country's bid to make the north-east its 'power plant'. It is seen as China's largest potential source of hydropower.

Governance and treaties

There is no basin-wide system of governance or cooperation on water management. With none of the countries are party to the UN Convention on the Law of the Non-Navigational uses of International Watercourses, and mistrust and power asymmetry among countries high, a basin-wide treaty is unlikely.

But bilateral collaborations do exist: China and India (data); India and Bhutan (hydropower) India and Bhutan and India and Bangladesh (risk management) – and more recently on inland water transport. This cooperation could be the trust-building basis for further collaboration.

Researchers fear the negative consequences of development action in the absence of basin-wide cooperation – and now could be a moment to focus on DRR, adaptation, groundwater, economic integration, flood control, ecological and biodiversity conservation to prevent future problems.

Connecting river basin governance to multilateral trade and investment fora will enable countries with varied economic interests to identify potential areas of collaboration.

Whereas water is the responsibility of the central governments in China, Bhutan, and Bangladesh, it is largely under the jurisdiction of individual states in India: Arunachal Pradesh, Assam, West Bengal, Meghalaya, Nagaland, and Sikkim. While mechanisms for dialogue between the six Indian basin states exist (eg the Brahmaputra Board), there have proved insufficient to harness opportunities or tackle challenges. Assam opposes Arunachal Pradesh's plans to build a hydropower dam.

Pan-basin platforms for dialogue do exist: the Brahmaputra Dialogue – established in 2013 by researchers in India and Bangladesh – 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 but with more needed to be done to include local communities.

But there remains secrecy around water data, and 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. There is a need for continuous data sharing, including both monsoon and dry season data, among all four riparian countries.

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.

Lack of formal institutions and agreements plus a view that, between India and China, water security is a zero sum game hampers collaboration. Bhutan's cooperation with India is attributed to Bhutan's savvy in fostering non-zero-sum thinking.

Thousands of km of embankments have been build but many fail due to poor design, planning, implementation, and faulty construction. With upper riparian governments focused on hydropower development, there seems to be limited understanding of the need for increased efforts and funding towards flood resilience.

Emphasising the need for integrated river basin management from both scientific and local community perspectives, 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.