THE INDIA FORUM
A JOURNAL-MAGAZINE ON CONTEMPORARY ISSUES

February 18, 2025

Does a Data Deficit Discourse Surround Fears over China's Brahmaputra Hydro Project?

By: Nilanjan Ghosh,Sayanangshu Modak

Available data does not establish that China's mega-dam project on the Brahmaputra could divert water, alter flows, or trap sediments . The real risk is dam failure due to high seismic activity and extreme climatic events. India should focus on issues relating to dam safety & real-time data sharing.

Since the publication of the book *Water: Asia's New Battleground* by Brahma Chellaney in 2011, media narratives and public discourse have been rife with concerns about the deleterious impacts of potential Chinese diversions of the Yarlung Tsangpo-Brahmaputra river system. The position propagating that China could dry out India's Northeast region through dam construction and water diversion while withholding sediment crucial for downstream floodplain formation has also been referred to in the literature as the *Brahma Hypothesis* . While China's upstream hydro-hegemony warrants moral and ethical scrutiny, the entire discourse on the Brahmaputra hydropolitics remains shrouded by a critical void — the absence of hard data. Such a data deficit discourse has consequently resulted in unsubstantiated myths, turning speculation into popular rhetoric thereby aggravating the already fragile hydropolitical landscape of the basin.

> Framing China's mega-dam at the Great Bend as a "geopolitical weapon" amid border tensions with India is misleading. This project was inevitable and is certainly not linked with a multi-pronged geopolitical agenda to dominate.

Recently, the Chinese government approved the construction of a mega-dam at the Great Bend of the Yarlung Tsangpo river in Tibet, often described as the longest tributary of the Brahmaputra river in India though there are variations in this viewpoint. Many treat Yarlung-Tsangpo as the main stem of the Brahmaputra system.

This hydropower project is envisaged to utilise one of the world's most lucrative real estate for hydropower development — a massive drop of 2,000 metres within a 50-kilometre stretch of the river as it flows toward India's easternmost state, Arunachal Pradesh, where it is known as the Siang. The Siang is one of the three main headwaters of the Brahmaputra river in India, making this development a source of significant concern. These apprehensions are further fuelled by unfounded rhetoric suggesting that the dam could alter the flow and course of the Brahmaputra, trap nutrient-rich sediment, and cause far-reaching downstream impacts in India and Bangladesh.

In an environment where transboundary hydrological data on Himalayan rivers is scarce and geopolitical tensions dominate public discourse, such rhetoric exacerbates tensions and misguides transboundary priorities. This piece aims to separate myth from reality and refocus discussions on scientific facts and actionable priorities.

Decoupling geopolitics from hydropolitics

Framing China's mega-dam at the Great Bend as a "geopolitical weapon" amid border tensions with India is misleading. This project was inevitable and is certainly not linked with a multi-pronged geopolitical agenda to dominate South Asia. The "Great Bend" was marked for hydropower development as early as 2003. Despite the immense potential, only 0.3% of the Yarlung Zangbo basin's potential for hydropower development had been harnessed as per estimates from a paper in 2017. Now, compare that with 24.6% for the Yangtze, 34.2% for the Yellow, and 58% for the Pearl, and it would seem obvious that the gaze would eventually lay on this stretch of the Yarlung Zangbo in Medog County in Tibet. This county's remoteness, connected by highway only in 2013, delayed this project, as did the sheer technical challenges of harnessing the incredible hydraulic gradient that the river creates. Presently, with China's push for carbon neutrality by 2060, hydropower has become essential — not just as a source of renewable energy but also for grid stability, balancing intermittent sources like wind and solar. Unlike wind and solar, which can generate power intermittently, hydropower can rapidly adjust its output to balance supply and demand, filling gaps when overall renewable generation is low or reducing the output during surpluses in energy production. This capability ensures a stable and reliable power grid, a key requirement during the transition to a clean energy future.

Rhetoric versus reality

Stretching 2,880 km from its origins in the Angsi Glacier in Tibet to its sink in the Bay of Bengal, the Tsangpo-Brahmaputra river system carves through the Tibetan plateau as the Yarlung Tsangpo for 1,625 km. Entering India, it flows for 918 km — first as the Siang, then the Dihang, before becoming the mighty Brahmaputra. In Bangladesh, its final 337-kilometer journey sees it renamed the Jamuna, merging with the Ganga river near Goalando, before completing its epic descent. Therefore, a conventional look at the map of the Brahmaputra, along with the fact that 56% of its length lies in Tibet as the Yarlung Tsangpo, gives the impression that the stretch in the Tibetan boundary of the river contributes substantially to its overall flow — suggesting that China can "turn off the tap." However, a recent paper unfolds a different story when hard data is brought into the picture.

The discharge of the Yarlung Tsangpo, measured at Nuxia in Tibet, is 31.2 billion cubic meters (BCM) annually, swelling to an estimated 135.9 BCM as it passes through the Great Bend and exits China. This rain-rich stretch of the river is where China plans to harness hydropower. However, when compared with the annual discharge of approximately 526 BCM at Pandu in Guwahati, India, and 606 BCM at Bahadurabad in Bangladesh, the data begins to unravel. This dramatic surge isn't driven by glacial melt but by the sheer force of the monsoon on the south side of the Himalayan crestline which extends predominantly to Medog County through a moisture corridor along the Yarlung Tsangpo Grand Canyon. While the mean precipitation (1978-2008) upstream of Nuxia is 416 mm annually, parts of Arunachal Pradesh and Assam can get over 4,500 mm of rainfall annually. This rainfall feeds powerful tributaries like the Dibang, Lohit, and Subansiri and fuels various springs dotting this landscape.

Concerns about China trapping sediment behind dams are equally exaggerated. Measured at Nuxia, the Brahmaputra carries 30 million metric tonnes of sediment annually, but by the time it reaches Bahadurabad in Bangladesh, this annual load increases to 735 million metric tonnes—most of it originating from the catchment within India. Even if China built multiple upstream dams, their impact on sediment dynamics would be minimal. It is the monsoonal precipitation again that drives the sediment regime of the Brahmaputra. So, simply put, China can neither "turn off the tap" nor "trap the sediments." Furthermore, a recent opinion piece by Wang Lei, Chargé d'Affaires a.i. of the Chinese Embassy in India, confirms that the water would not be used for consumptive purposes, thereby indicating that there would not be any inter-basin transfers.

Outlining the priorities

The primary risk posed by this project is not water diversion but dam failure, particularly in the face of extreme climatic and seismic events. The eastern Himalayan syntaxis is one of the most seismically active regions in the world, making infrastructure projects of this scale inherently vulnerable. India has had enough tragic experiences of its own following recent disasters like the Chamoli disaster of 2021 and the Chungthang dam collapse of 2023. With climate change driving unprecedented glacial retreats, avalanches, and Glacial Lake Outburst Floods (GLOFs), the likelihood of cascading hazards increases. A stark reminder of these risks came in March 2021, when a massive glacier collapse in the Sedongpu River basin triggered a debris-laden flood in the Yarlung Tsangpo's Grand Canyon, raising water levels by 10 meters. Such extreme events have the potential to destabilise large dams, leading to catastrophic downstream flooding.

> India should use this as an opportunity to push for a comprehensive framework agreement with China on the Brahmaputra... Rational hydro-diplomacy can be enabled only if hard data is brought into the broader discourse at the highest levels of discussions.

Thus, India's concerns over China's dam at the Great Bend should focus on dam safety and data sharing rather than alarmist rhetoric about water control. Engaging China through both the Expert Level Mechanism (ELM) and high-level diplomacy is essential to ensure transparency and preparedness. An immediate priority is renewing and improving the Memorandum of Understanding (MoU) on hydrological data sharing, particularly real-time data from the Yarlung Tsangpo stretch between Nuxia, in Tibet, and Tuting, in

Arunachal Pradesh. We show in a paper that this stretch, presently a blind spot for India, experiences high precipitation as well as extreme rainfall events. Additionally, China must share dam designs, contingency plans, and emergency protocols, recognising that India bears the greater risk in case of failure.

Beyond such immediate concerns, India should use this as an opportunity to push for a comprehensive framework agreement with China on the Brahmaputra. Such an agreement should include provisions for water-sharing, joint monitoring, dispute resolution, and collaborative decision-making. Moving from reactive posturing to proactive engagement will be key to long-term regional stability. Rational hydro-diplomacy can be enabled only if hard data is brought into the broader discourse at the highest levels of discussions.

Nilanjan Ghosh is Vice President – Development Studies and Senior Director – Kolkata Centre at the Observer Research Foundation. Sayanangshu Modak, a human-environment geographer and a scholar of water governance, is a doctoral researcher at the University of Arizona at Tucson.

The article was first published on Mongabay India and is being republished here with permission.