The Looming Wall: Understanding the Consequences of China's Dam Project on Bangladesh Economy

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ABSTRACT

Bangladesh's textile industry, which accounts for over 80% of the country's export earnings and sustains millions of livelihoods, is critically dependent on consistent freshwater access—much of which is sourced from the Brahmaputra River (Sikder, 2019). This study aims to identify the construction of the Yarlung Tsangpo mega-dam by the Chinese and its potential economic implication downstream, especially in the upper course of the Brahmaputra, and its future impact for Bangladesh's water-intensive textile sector. By applying a qualitative approach, this paper uses existing reports and literature to assess how upstream dam construction could impact water access for Bangladesh's textile industry. Our analysis indicates that seasonal water diversion or disruption could significantly impact textile production capacity, particularly in northern and central zones reliant on the Brahmaputra for dyeing and washing processes (Restiani, 2017). The pressure on Bangladesh's economy becomes even more prevalent in the absence of any binding water-sharing agreement between China, India, and Bangladesh. With no clear regulations in place to manage how water is used or how large projects like dams are built upstream, millions of people downstream are left exposed. For Bangladesh itself, this could be translated as an urgency to address the livelihoods tied to its textile industry which could be put at immediate risk by decisions made far beyond its borders. (Manhas, 2025). In conclusion, the study underscores the urgent need for Bangladesh to strengthen its infrastructure and engage in strategic diplomacy to protect its textile-driven economy from the growing risks posed by upstream water control.

Keywords: Water Politics, Global South, Economy, BRICS, Textile Industry

Introduction

China's plan to construct dams have come to be examined in some research undertakings in the past. Some of these studies may not be solely focused on the new dam project, but they nonetheless still provide some insight into the issue. First, there is the work of Ridwan and Idris (2025) that focuses on China's dam project that affects the food security of states near the Mekong River, e.g. Thailand, Laos, and Cambodia. The study finds how dam construction has repercussions on food security ranging from water pollution that affects rice fields irrigation and changing patterns of fish migration. Two of which are important elements of food security in the region as it affects farmers and fishermen alike.

Moving on, there is also the work of Gidara et. al. (2024) with a focus on the hydro-political dynamics between China, India, and Pakistan along with how its governance is

maintained amidst geopolitical dynamics. Construction of dams represents the interests of states over various fields, notably energy and geopolitical interests. Additionally, the move to initiate such a project can affect the interest of other states in the region, which could then lead to conflicts. The article finds that a comprehensive understanding needs to be shared and there needs to be some structural reforms in the pertinent international legal framework.

Finally, there is the work of Olson and Frenelus (2024) that has its focus on human and environmental repercussions of the Lancang-Mekong mainstem and tributary dams and how the interest or plans of China, Laos, Cambodia, Thailand, Myanmar, and Vietnam, can affect the river. The study finds that there are risks of future droughts that could push for an agreement between the relevant states to manage the river resource. The study recommends that future plans to construct dams should include some features to reduce environmental repercussions. Aside from that, there needs to be more cooperative endeavors to formulate agreements and address shared issues that can affect those that rely on the river.

There have been few research endeavors surrounding China's plan for the world's biggest hydropower dam that recently has begun constructing. Many were focused on the other projects, specifically in the Mekong River area. However, such endeavors still provide insight into the dynamics surrounding the project and its implications. The aforementioned findings can assist in the writers' efforts to navigate the problem at hand. With the research landscape in mind, the article seeks to contribute by filling the research gap. This is done specifically by narrowing the problem to how this project affects Bangladesh as one of the countries affected by the project.

Methods

In this study, the writers employ the descriptive qualitative research method. Qualitative research can be surmised as research that seeks to explore and understand the meanings to a social human problem (Creswell, 2012). The descriptive approach of the study is opted so the writers can get a better grasp of the problem and its pertinent features from the data they procured. The writers draw upon an extensive literature study that encompasses both primary and secondary in a myriad of forms, e.g. news articles, prior studies, government press releases, international organizations documents, and more. In procuring the data, the writers utilize the internet data collection technique that opens the door to countless sources and forms of information on the internet. The data collection technique also leaves room for triangulation to ensure that the data is free of misinformation by comparing one source with another. The data that the writers use are the ones that revolve on the issue of China's construction of a hydropower dam as well as how it is perceived by the international community, primarily its neighbors. Afterwards, the writers then organize and interpret the data to gain the needed understanding over the hitherto established issue.

Discussion

Geopolitical and Hydrological Background

Originating from the Tibetan plateau and flowing freely east across Tibet region, the Yarlung Tsangpo is considered as one of Asia's highest major rivers in terms of elevation (Liu *et al.,* 2025). It follows the route that establishes itself within Tibet continuing to India by making a sharp turn also known as the Great Bend near the Namcha Barwa massif and then merging with Siang River by entering India's Arunachal Pradesh region. The river continues its flow by converging with tributaries in Assam to form the Brahmaputra River and finally crosses into Bangladesh which the local called Jamuna (Ahmad *et al.,* 2025). The Yarlung Tsangpo basin itself spans a vast system of nature hydrology by running across three countries, which supports hundreds of millions of people downstream and provides one of the most fertile floodplains in South Asia (Jiang *et al.*, 2025).

The stakes are different for China, which holds the upper part of Yarlung Tsangpo as it offers them various opportunities, such as a renewable energy frontier to be harnessed while also being a strategic asset. Developing hydropower capabilities in an otherwise remote region of Tibet aligns with Beijing's national aim of energy independence and security, integration of economy among border regions, and exerting control over precious water commodities within its border (SCMP, 2025). As for India, it views the river as its lifeline for its population in the northeast of the country by being a vital interest for its navigation, irrigation, and ecosystem security. Both countries share a geopolitical flashpoint especially in the Arunachal Pradesh area where the river crosses disputed territory (Akhtar, 2017). On the other hand, Bangladesh as the most downstream country on this list, depends on the flows from Brahmaputra's to sustain its agriculture, inland transport, and their water-intensive industries most famously known for ready-made garments (Pradhan *et al.*, 2021).

The nature of the basin which is transboundary is another classic example of hydro-politics. Any intervention in the upper region of the river, such as dam construction has the potential to influence seasonal water timing, sediment transport, and flood occurence. At Bangladesh's Bahadurabad gauge, the Brahmaputra's annual mean discharge is around 20,200 m^3/s, with typical peak floods reaching ~70,000 m^3/s and an historic maximum of 102,534 m^3/s recorded during the catastrophic 1998 flood (Palash *et al.,* 2023, Shammi *et al.,* 2021). The river itself carries a huge number of sediments which roughly accounts for about 764 million tonnes per year that help to sustain Bangladesh's deltaic plains despite being highly sensitive to upstream regulation (Shaik, 2025). Seasonal dynamics are also dominated by monsoon precipitation which usually start the cycle in July–September, while snow and glacier melt play a much smaller role (Rao *et al.,* 2020). Despite most of the the river's annual discharge originating within Indian border through tributaries fed by typical monsoon season, China's position within the upstream portion of the river gives it bargaining chip in shaping perceptions of water security and how it influences the strategic calculus of their downstream neighbours (Ghosh, 2017).

Yarlung Tsangpo saw its most significant development in China's upstream region with the construction of Zangmu hydropower station built on Brahmaputra's main stem that began its operation in October 2015. It generates 510 MW and marks a significant signal of Beijing's shifting focus into the Tibet region by assigning it to a state-owned company, Huaneng Group (Ranjan, 2020). It was presented to the domestic audience as part of Tibet's economic modernization and a wider leap into renewable energy, not to mention the immense geopolitical leverage it exerted to its neighbours by giving Beijing the ability to control and monitor downstream flows for the first time (Eco-Business, 2015).

Shortly after, this first step was followed by another construction of a hydropower station known as Gyaca (Jiacha) which was completed roughly in 2020 and operated by Huaneng Group (Ranjan, 2020). It is located further 150km downstream of Zangmu which further reinforced the rise of the mid-reach cascade system. The third installation known as Jiexu hydropower station is currently under construction and estimated to produce around 510 MW (Ranjan, 2020). Although these dams have in common lack of large-scale holding capacity and mostly are run-of-river, their capacity to regulate water releases allows Beijing a degree of seasonal flow control and precious hydrological data in otherwise politically sensitive basins (CSIS, 2025).

But all those dams stand pale to Beijing's most ambitious and contentious project, the Great Bend megadam located at the lower portion of Yarlung Tsangpo, specifically in Medog county, which is near the disputed India's Arunachal Pradesh. The plan was approved in December 2024 and is under construction by mid-2025 with a whopping price tag of ¥1.2 trillion (Reuters, 2025). It involves a five-cascade complex that is estimated to generate 300 billion kWh annually, which surpassed the output of the Three Gorges Dam by three times (SCMP, 2025). Located within a high-seismic zone, the project faces not only engineering challenges but also its potential to alter flood occurrence, dry-season water reserve, and sediment delivery further downstream (SCMP, 2025). The absence of a formal water-sharing agreement between the three parties only heightened such concerns, particularly in New Delhi and Dhaka (Ghosh, 2017).

Scientific studies indicate that the hydrological leverage one could exert in such projects is leaning more towards timing rather than volume. About 65-70% of the Brahmaputra's total discharge originates within India, mainly by monsoon-fed tributaries, while roughly 25% comes from Tibet in the form of snow and glacier melt (Rao et al., 2020). This could be interpreted that the construction of such a huge dam upstream is unable to significantly reduce annual flows to India and Bangladesh. But they are still able to reshape the seasonal hydrograph by delaying or advancing flood peaks, changing dry season flows, and containing significant portions of the river's ~764 million tons annual sediment discharged measured at Bangladesh's Bahadurabad gauge (Shaik, 2025). These hydrological adjustments, coupled with China's position further upstream and data control, give the megaproject dam a significant strategic value in regional politics.

Positioned at the terminus of the Brahmaputra system, Bangladesh viewed the river not only as an ecological lifeline but also as the country's economic pillar. Known also as the

Jamuna, the Brahmaputra existence within Bangladesh supports its very fertile floodplains which gives significant basis for its agricultural output, inland navigation, fisheries, and urban water supply, yet its most crucial role is in sustaining the country's ready-made garment (RMG) sector, which accumulates for more than 80% of national export earnings plus provide employment for over than four million people (BGMEA, 2025). Factually, textile production in Bangladesh is highly water-intensive which on average requires 160 to 300 liters of freshwater per kilogram of fabric (Uddin et al., 2023; Nahar et al., 2024). Despite groundwater pumping providing most of the water supply for factories, the aquifers that feed them are seasonally replenished by river flows and sometimes from associated floodplain recharge, thereby connecting industrial water security concern to upstream hydrological changes.

Changes in Brahmaputra discharge that occur seasonally, whether from upstream regulation or natural variability do have cascading implications for the economy of Bangladesh. A reduction or even a delay in pre-monsoon flows could alter the very said equations, such as increasing pumping costs, reducing water quality, and disrupting the inland navigation of raw materials and finished products between industrial hubs such as Dhaka, Gazipur, and Narayanganj (UN ESCAP, 2021). On the contrary, sudden discharge during the high-flow season could aggravate flooding, damage infrastructure and put a halt on production. While the megadam project constructed by China not significantly alter the river's annual volume, their ability to influence timing, sediment transport downstream, and flow variability makes them a strategic variable for Bangladesh, the one that converges with their trade competitiveness, employment stability, and nation-wide development path which are all crucial for a developing nation (GWICA, 2024).

The Role of Water in Bangladesh's Textile Industry

Globally, fashion production is currently on the rise, as can be seen in Bangladesh's booming industries of textile and ready-made garments (RMG). This industry around the globe annually consumes around 93 billion cubic meters of water, a staggering amount of water that underscores how crucial water is to the textile sector (ISPO, 2024). Bangladesh itself is the second-largest garment exporter in the world; therefore, water is a critical supply at every stage of production (New Age, 2024). Due to that, the country's textile industries have also become major water consumers; as an example, a kilogram of fabric material in Bangladesh is estimated to use around 250-300 liters of water, about the daily water use of two people (SIWI, 2017). Such a massive water footprint indicates the industry's dependency on abundant water resources while also raising questions about sustainability in the long run.

In the industry itself, most water consumption comes from wet processing which includes bleaching, dyeing, printing, and finishing. 85% of all water that is consumed by textile industries happens in these stages (Prashad, 2024). For the sake of perspective, a kilogram of denim fabric can take up to 250 liters of water while a kilogram of cotton fabric uses around 150-200 liters on average (Nahar, 2024). On a nationwide calculation, the textile and garment industry in Bangladesh are set to consume 1.500 billion liters of water annually (Bandera, 2024). The same amount of water is equivalent to the total

household consumption of roughly 20 million people for around 5-10 months (Textile Learner, 2024). Such numbers demonstrate how strained freshwater resources due to textile industries demand in Bangladesh.

Such intensive water use also comes with large amounts of wastewater, making textiles a top polluter of water industrial-wise. This is mainly due to extensive use of various substances such as dyes, salts, and chemicals which all contain some trace elements like heavy metals and organics (SIWI, 2017). Most factories within these sectors have been discharging their wastewater directly into rivers, sometimes without proper treatment and therefore degrading the water quality (SIWI, 2017). Studies also put the textile industry as the most polluting industry in Bangladesh based on their water impact, even surpassing tanneries and others (SIWI, 2017). With this knowledge in hand, not only textile industries strains water supply, it also contributes to untreated toxic wastewater that only puts a risk on the environment and public health.

When compared with other textile-producing countries in Asia, Bangladesh's water usage in textile production is higher. As an example, China, the world's largest textile industry has achieved much higher water efficiency in modern mills, by consuming an average of 50-150 liters of water per kilogram of fabric in wet processing (Li *et al.,* 2023). Bangladesh's neighbour, India also has some interesting variation, some plants use as little as ~60 liters per kilogram while the older plants can use up to more than 600 liters per kilogram, which put on an average 172 liters of water per kilogram of cloth (Patel, 2015). Such comparisons highlight the current reality of Bangladesh's textile industry which still has room for improving its water efficiency. Due to this concern, innovations are starting to emerge within the region, one such is the adoption of Zero Liquid Discharge (ZLD) technology by some Indian factories that have proven to cut water use in dyeing process from around 160-180 liter per kg to an average of 50 liter per kilogram by recycling and reusing water (Yagay, 2025). It is a clear indicator that technological upgrade and manufacturing efficiency could reduce the usage of water in Bangladesh's textile sector without compromising the amount of output.

Recent improvements still do not neglect the fact that Bangladesh's textile sector remains fundamentally water-intensive, necessitating the discussion on future water security. The country's export of garments has grown to $47 billion in 2023 exports, which only further exacerbates the growth in water demand (Siddiqi, 2025). If this trend continues, the consumption of water will eventually keep rising. Analysis from 2015 reports that "business-as-usual" growth in the textile sector would demand thousands of megalitres of additional water annually. Annually, this sector alone extracted an estimated 1.500 million meter cubic of groundwater for textile processing (Swisscontact, 2022). To put that strain into perspective, overextraction of groundwater around Dhaka, which acts as the main industrial hub, has caused the water table to drop by 10 meters in a decade (SIWI, 2017). By 2030, experts projected that Bangladesh could face a 21% water supply deficit in the dry season which can be attributed to the need for higher industrial water demand (GWICA, 2024). Overall, water is a resource that is highly limited for the textile industry, while it significantly enabled Bangladesh's garment boom, but due to lack of efficiency improvements and management

optimisation, water scarcity and pollution is slowly but surely becoming a reality that might jeopardize the sector's existence.

Due to industry's dependency on freshwater, the geographical location of textile clusters industry becomes critically important. In Bangladesh, this dependency is evident in regions situated along the Brahmaputra and its distributaries, where industrial expansion has deep history with proximity to abundant surface water. Therefore, understanding the concentration of these textile clusters helps to expose the spatial dimension of water reliance and the vulnerabilities to any changes in river flow.

The Jamuna River (also known as Brahmaputra) serves as the lifeline for the majority of Bangladesh with some regions dependent on its water for daily living. Millions of people who live along the river's banks rely on it for everyday needs which include drinking, household water consumption, sanitation, irrigation of crops, fishing, and river transport. The importance of Brahmaputra flow is to be said *"crucial for more than 160 million people"* in Bangladesh (Manhas, 2025). Bangladesh's annual water flow is supplied mostly by transboundary rivers like the Brahmaputra (which includes Ganges and Meghna) by about 80% compared to local rainfall which only provides a modest amount of 20% (Chowdhury, 2012). This could be interpreted that Bangladesh's water supply is tied to Brahmaputra's water volume. In a daily scenario, villagers in riverine districts utilize Brahmaputra for sanitation, fishermen catch river fish, farmers depend on its water (sometimes alluvial groundwater as well) to irrigate paddy fields or other crops, while textile factories consume the water for its production needs.

Most of the regions that relied on Brahmaputra can be clustered in several northern and north-central districts, therefore any deviations in the river's flow have a tangible impact on the average daily and economic activities (which includes agriculture and aquaculture) there (CNA, 2016). However, seasonal shortages can also hit these areas harshly, such cases can be seen in the dry season which impacts crop yields due to reduced river flow. One such example is the Teesta River which itself a tributary of the Brahmaputra specifically in Rangpur region, upstream diversion by India caused the river to nearly dry in winter and impacted agriculture. A lot of farmers in Teesta-dependent regions have no choice but to let land fallow or switch to less water-consuming (also lower-value) crops, further reducing their incomes (Islam, 2025).

During the monsoon, the Brahmaputra also experienced overflowing waters that frequently inundate the very same communities. Seasonal floods along the river basin cause significant social and economic damage by displacing families, submerging crops, and damaging infrastructure. Severe monsoon floods also impacted logistics and operations in the garment sector: floodwaters impeded the transport of imported cotton from Chittagong port to Dhaka. One Dhaka apparel company that on average ships around 50.000 shirts daily must stand ready to lose around $250.000 of output per day due to flood-induced stoppage (Reuters, 2024). Sector leaders also warned that Bangladesh could lose around 10-15% of their textile orders to other countries due to delays that occurred (Reuters, 2024). We can look at how often these catastrophic floods inundated more than half of the country in 1951, 1987, 1988, 1998, 2004, and

2010 (Hasinur *et al.,* 2017). For summary, while regions like northern Bangladesh do enjoy higher availability of water for daily and economic activities, they are always on the watch for any changes, be it man-made upstream changes or harsh climate-induced flood and droughts that may means livelihood losses, decrease in agricultural output, and reduced textile factory output.

Besides being hydrologically strategic, these water-proximate regions are economically crucial to the nation of Bangladesh. They acted as one of the highest-output areas in Bangladesh's textile economy, directly contributing a significant amount of the country's garment exports. Therefore, any deviations to the calculus of water reserve in these regions, be it an upstream flow alteration or seasonal variability, can create a cascade through the national economy, thereby amplifying localized issues into nation-wide ones.

The proximity to water bodies has made the geography of Bangladesh's textile industries into what we know today, and the "water-accessible" textile zones have enormously contributed to the nation's economy. About 70% of Bangladesh's textile wet-processing units are centered in and around Dhaka, while the rest are adjacent to Chittagong (Chattogram) (SIWI, 2017). Importantly, 95% of these factories are near rivers or other forms of water bodies in these two regions (SIWI, 2017). Easy access to huge water and convenient wastewater disposal has made industrial clusters in Gazipur, Savar, Narayanganj, and other Dhaka suburbs sprang up easily along riverbanks or near one. Thanks to such proximity to water, high-density textile production has contributed in 2022-2023 around $45-47 billion into Bangladesh's economy (Siddiqi, 2025). To put that into perspective, ready-made garments or textile sectors yield over 80% of Bangladesh's export earnings and around 11% of the country's GDP, with a huge chunk of this economic activity centered around the water-rich Dhaka metropolitan region and a smaller percentage contributed to other riverine industrial zones. (Reuters, 2024; Siddiqi, 2025) and accommodate employment for around 4 million workers nationwide (mostly women) (Siddiqi, 2025). As a result, the abundance of water within these areas has propped Bangladesh to become a garment powerhouse, with significant contributions into economy, employment, and development.

Risk Assessment: Impact of Water Deviation

China's plan to construct a megadam on the Yarlung Tsangpo region has indeed raised alarms in Dhaka and New Delhi. The water that feeds Bangladesh, one of which is Brahmaputra, is Bangladesh's lifeline as it provides critical water for millions, be it for civilian daily use or factories consumption (Shuvo, 2025). One of the significant concerns that arose is the potential decline in dry season flows had the water be halted for storage purpose or diverted further upstream. Naturally in the dry-season, the Brahmaputra's flow is low which means any further reduction could impact severely by triggering drought-like conditions in certain areas of Bangladesh (De Santis, 2025). A study highlighted that if upstream dams or diversion could reduce Brahmaputra water volume by even around 20%, many areas further downstream could dry out, imperiling irrigation and water supply (Wentzell, 2013). As a predominantly agrarian country with around

80% of Bangladeshi farmers working on water-intensive rise (Wentzell, 2013), the Bangladesh government would have to take the necessary measures to mitigate the potential risk in lean-season flow, especially in food security and rural incomes.

Looking at seasonal effects, an upstream dam will still impact how water is released over the year. On paper, a hydropower dam could regulate extreme conditions by storing excess monsoon runoff and releasing it in the drier season. If operated with strict adherence to regulations and without any diversion that is considered consumptive, the dam might increase downstream flow in dry months and reduce the risk of flooding in monsoon (Shuvo, 2025). In fact, most of the dam works around by controlling year-round release that mitigate floods that can be dreadful while also improving water availability during dry season, a potential benefit for Bangladesh itself given that no water is siphoned out of the basin (Shuvo, 2025). But, as optimistic as this outcome sounds, it basically hinges on transparency and cooperation between countries, one that international diplomacy is here for. A worst-case scenario would happen had China unilaterally diverted or stored water without diplomacy between Dhaka and Beijing. Although assurance from Chinese officials on the issue that the dam will not have any tangible effect whatsoever in the downstream regions and is designed for power generation and flood control (Wong, 2025). Yet New Delhi and Dhaka remain vigilant of unpredictable releases or even prolonged withholding of water. Any sudden technical decision further upstream such as sudden large release during emergency drawdown or spillover could create artificial flooding downstream (De Santis, 2025). Already prone to floods in which about up to 20-30% of its land is submerged on a normal monsoon (Hossain *et al.,* 2020), Bangladesh could again have many destructive floods due to uncoordinated and mismanagement of the dam. On the opposite end of the spectrum, filling the massive reservoir will certainly hold back substantial volume of water (crucially during the early stage) leading to an abrupt and substantial reduction in downstream flow reaching Bangladesh (Zaniolo *et al.,* 2021). Such scenario will exacerbate during winter and spring season when river flow will be majorly dependent on upstream contributions and rain is scant. During the monsoon season, a significant portion of water in Brahmaputra's river comes from Indian and Bhutanese rainfall specifically from eastern part of Himalayan foothills, while the dry-season flow will be mainly influenced by glacier melt and baseflow contributions from Tibetan basin (Smith, 2018). In short, any upstream deviation at such a critical time of the year could leave the Jamuna River in Bangladesh (known as Brahmaputra by the locals) running threateningly low.

Another critical concern is sediment and erosion dynamics. Descending from the Tibetan basin, the Brahmaputra water flows are also followed by enormous sediment loads (on the order of around 1 billion tonnes annually) that help to revitalize Bangladeshi floodplains fertility and for the formation of natural delta (Raff *et al.,* 2023). Such a massive dam would hold much of this sediment, leading to lower sediment deposition downstream, which creates channel incision (deepening) of the riverbed and destabilizes the bank (ICSF, *n.d.*). By altering the river's natural flow, experts warned

that it may reduce its channel capacity making the depth much shallower thanks to fewer peak flows to flush sediment (Debnath *et al.,* 2023). Like both sharp edges of a knife, this can also increase flood risk gradually due to a much shallower channel that makes banks overflow much more easily. (Debnath *et al.,* 2023). Lower sediment supply and flow variability thanks to the dams could alter channel patterns and habitats and thereby causing declines of aquatic ecosystems along with river degradation (ICSF, *n.d.*). A formal request by Bangladesh to China has been confirmed regarding the fear about reduced downstream flows and ecological impact it may cause, citing that any intervention in major upstream, be it withholding water during dry season or releasing extra flow during monsoon, could affect livelihood of millions of people downstream (Master, 2025). Thus, the transboundary nature of the Yarlung Tsangpo can widely be accepted as any decision taken upstream will reverberate through India and Bangladesh, and without an agreeable water-sharing treaty, Bangladesh will remain vulnerable to these flow uncertainties, emphasizing the need for cooperative management to prevent catastrophe in the near future.

The true significance of hydrological analysis becomes tangible when translated into socio-economic terms. Given Bangladesh's unique hydrological situation and its geographical position as a lower riparian state, any upstream regulation or alteration can have cascading operational consequences. The following part analyses how these hydrological shifts may materialize as a concrete economic issue, especially within Bangladesh's export-focused textile sector.

Both RMG and textile sector is an economic linchpin for Bangladesh due to how it contributes significantly to the nation's export earnings by around 80%, employing 4 million people, and contributing around 10% into the nation's GDP (Paul, 2025). Due to the fundamentally water-intensiveness of this industry, starting from the cultivation of cotton and through the wet process of the industry, any deviation in the calculus of Brahmaputra River flows in the upstream dam activity could put a strain on textile manufacturing, which comes with harsh cascade measured in output, jobs, and export revenue. Therefore, we outline three possible impact scenarios depending on how the water flows.

A. No Diversion - Status Quo

   If China operates the dam solely to harness its hydropower without any interference in downstream flow along with ideal releases of stored monsoon water during dry seasons, Bangladesh could cherish its new water availability and therefore its hydrological security. Such a scenario would translate into continuous production cycles, thereby maintaining garment output, employment, and exports ($36.2 billion in FY 2023-24 were from RMG exports) (Ahmed, 2024). However, this scenario is based entirely on transparent water-sharing agreements and active diplomacy.

B. Moderate Flow Reduction

This scenario put Bangladesh in a moderate dry-season water flow reduction by 10-15% due to initial filling of the dam reservoir or flow retention thereby causing further strain in the already stressed water supplies. The textile industry already used over 4 billion liters daily (Uddin, 2023), while groundwater levels near the industrial sector are already shrinking at a rapid pace. Due to lower flow of river water, factories are forced to heavily invest in deeper groundwater pumping, thereby incurring extra costs and might put a slowdown on production. This scenario would cause a modest decline in output, several temporary unemployment issues, and reduced export growth.

C. Severe Disruption

A huge upstream diversion or disruption caused by a 20-30% dry-season flow loss could be detrimental and caused heavy-water process shutdown, permanent factory closure, and nation-wide unemployment crisis in the textile sector. Such impact can be similarly interpreted as in recent 2024 flooding, logistic delays due to flood reduced about 50% of garment production while redirecting quota orders to competitors (Ahmed, 2024). In this least favorable scenario, an economic crisis is bound to happen in Bangladesh.

The Way Forward for Bangladesh

Following the previous sections, it can be discerned that Bangladesh stands to receive be affected by China's new dam project. Here, it is faced with the crucial need of maintaining its water security that encompasses its food production and textile industry, as well as the risk of flooding. The task of working its way around the new development is made further challenging given its strong reliance on the river. With so much at stake, Bangladesh cannot afford to just sit idly and let the wave crash upon itself.

To begin with, Bangladesh needs to maintain and keep on building an active line of communication with China. Said line of communication, along with the overall positive ties between the two states, is important in fostering trust, especially given the sheer size of the project. By maintaining good ties and a stable line of communication with China, Bangladesh can better voice its concerns surrounding the project as well as backing it up with relevant research. In addition, maintaining good ties with India can also serve as a leverage for both states to strengthen their voice or standing in engaging China. Such a feat can also bolster the effort to ensure that Bangladesh and other countries that are affected by the project have their voice heard or even have a say in the way the project is developed. The importance of line of communication is further supported by China's willingness to communicate with Bangladesh. Back in July, China assured Bangladesh that its dam project includes no water diversion and how it will not alter the water volume (Bdnews24.com, 2025).

Given Bangladesh's position, it also needs to pay attention to India as well. Such is the case as akin to Bangladesh, India also finds itself as one of the states affected by China's

new dam. Additionally, the Brahmaputra River also passes through India first before it reaches Bangladesh. With that in mind, Bangladesh also needs to engage in a cooperative endeavor with India or strengthen its positive ties, especially when it comes to water or river management. These positive ties can also pave the way for a clearer framework of water management surrounding the Brahmaputra River that Bangladesh relies on since it passes through India beforehand (Asaduzzaman, 2025). While not being directly related to China's dam project, it can nonetheless provide Bangladesh and India with the assurance that both are on the same page over their part of the river. This benefit can also be seen in a regional security perspective, specifically of South Asia, as it would bolster the region's regional security by strengthening the pattern of amity between the two states.

Beyond the efforts to undertake abroad, Bangladesh also needs to take pertinent domestic strides, especially when it comes to its textile industry. To begin with, it can seek to increase the efficiency of the relevant infrastructure or facilities of the textile industry. Such a move can reduce the amount of water that the industry consumes, which is beneficial in the long run. By carrying out those measures, Bangladesh can secure its textile industries' present growth and activity. While it cannot be denied that Bangladesh water security is still dependent on external factors, Bangladesh can nonetheless benefit from the improvements that those measures can yield. Taken together, despite the ongoing reliance it has on the Brahmaputra River, Bangladesh still has some leeway to improve its position.

Conclusion

China's new dam project can have various implications for the region's development, including for Bangladesh. Among its many sectors, Bangladesh textile industry stands to be one of the most affected. Such is the case as the project adds more factor to its dependence on the Brahmaputra River. At its worst, the project might accentuate the vulnerability surrounding the industry's reliance on water from the river. Therefore, it can be understood how the project has garnered concerns from Bangladesh as one of the riparian states, especially to the Brahmaputra River. Finally, in response to the development, Bangladesh can seek to take some domestic and international strides. For the domestic ones, it can seek to improve the efficiency of the textile industry's water consumption and usage. For the international ones, Bangladesh can strive to strengthen its ties with both India and China as the Brahmaputra river also encompasses both of them. Moreover, it needs to maintain a good line of communication with China as a means to foster trust and offer its input or concern surrounding the project.

Future research endeavors into the matter can incorporate new frameworks or approach, among them is by using systemic thinking and threat identification. The former can be employed to map and understand how the many variables pertinent to the matter relate to each other. Such an understanding can serve as a valuable insight to pinpoint critical issues for Bangladesh. As for the latter, the framework can serve to better understand how the problem at hand can be seen as a threat with high or low

intensity. The understanding derived from that framework could contribute to the way in which the government should respond.

References

Ahmed, T. (2024, November 1). *Cotton and products update: Dhaka, Bangladesh* (Report No. BG2024-0012). United States Department of Agriculture, Foreign Agricultural Service. https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Cotton+and+Products+Update_Dhaka_Bangladesh_BG2024-0012.pdf

Ahmad, N., & Lodrick, D. O. (2025, August 4). Brahmaputra River. *Encyclopedia Britannica*. https://www.britannica.com/place/Brahmaputra-River

Akhtar, M. (2022, August 3). Reviving the Brahmaputra as the lifeline of travel and trade. *The Wire*. https://thewire.in/environment/reviving-the-brahmaputra-as-the-lifeline-of-travel-and-trade

Asaduzzaman, M. (2025, August 6). The strategic ripples of China's mega-dam for Bangladesh. *The Diplomat*. https://thediplomat.com/2025/08/the-strategic-ripples-of-chinas-mega-dam-for-bangladesh/

Babul Hossain, Md., Salman Sohel, M., & Ryakitimbo, C. M. (2020). Climate change induced extreme flood disaster in Bangladesh: Implications on people's livelihoods in the Char village and their coping mechanisms. *Progress in Disaster Science, 6*, 100079. https://doi.org/10.1016/j.pdisas.2020.100079

Bandera, G. (2024, April 25). How the fashion industry pollutes our water. *FairPlanet*. https://www.fairplanet.org/story/how-the-fashion-industry-pollutes-our-water/

Bangladesh Garment Manufacturers and Exporters Association. (n.d.). *Export performance*. Retrieved August 2025, from https://bgmea.com.bd/page/Export_Performance

Bdnews24.com. (2025, July 25). Brahmaputra upstream dam: Bangladesh puts faith in Beijing's assurance. *The Financial Express*. https://thefinancialexpress.com.bd/national/brahmaputra-upstream-dam-bangladesh-puts-faith-in-beijings-assurance

Center for Strategic and International Studies. (2025, June). *China's gray zone infrastructure strategy on the Tibetan Plateau: Roads, dams, and digital domination*. https://www.csis.org/analysis/chinas-gray-zone-infrastructure-strategy-tibetan-plateau-roads-dams-and-digital-domination

Chowdhury, S. Q., & Hossain, M. S. (2012). Flood. In S. Islam & A. A. Jamal (Eds.), *Banglapedia: National Encyclopedia of Bangladesh* (2nd ed.). Asiatic Society of Bangladesh.

CNA. (2016). *Bangladesh: Lowest riparian with the most to lose* [Policy report]. Center for Naval Analyses. https://www.cna.org/archive/CNA_Files/pdf/cna-brahmaputra-bangladesh.pdf

Creswell, J. W. (2012). *Research design: Pendekatan kualitatif, kuantitatif, dan mixed*. Yogyakarta: Pustaka Pelajar.

Debnath, J., Sahariah, D., Lahon, D., Nath, N., Chand, K., Meraj, G., Kumar, P., Singh, S., Kanga, S., & Farooq, M. (2023). Assessing the impacts of current and future changes of the planforms of River Brahmaputra on its land use-land cover. *Geoscience Frontiers, 14*, 101557. https://doi.org/10.1016/j.gsf.2023.101557

De Santis, A. (2025, January 25). The geopolitical and environmental implications of China's Brahmaputra dam project. *Essydo Politics*. https://essydo.com/2025/01/25/the-geopolitical-and-environmental-implications-of-chinas-brahmaputra-dam-project/

Eco-Business. (2015, November 9). Brahmaputra dams hold back silt, not water. *Eco-Business*. https://www.eco-business.com/news/brahmaptura-dams-hold-back-silt-not-water/

Ghosh, N. (2017, December 18). The Brahmaputra: Floated myths and flouted realities. *Dialogue Earth*. https://dialogue.earth/en/uncategorized/the-brahamaputra-floated-myths-and-flouted-realities/

Global Water Innovation Centre for Action. (2024). *An analysis of industrial water use in the textile industry of Bangladesh with a focus on economic sustainability*. Partnership for Clean Textile (PaCT). https://www.textilepact.net/wp-content/uploads/2019/12/an_analysis_of_industrial_water.pdf

Godara, H., Pathania, J. M., & Kumar, G. (2024). Hydro-political dynamics between China–India–Pakistan: Dams and transboundary river governance amidst geopolitical contestations. *Journal of Asian Security and International Affairs, 11*(3). https://doi.org/10.1177/23477970241263154

Hasinur, M. R., Sadequr, M. R., & Mostafizur, M. R. (2017). Disasters in Bangladesh: Mitigation and management approaches. *Barisal University Journal, 4*(1), 139–163. https://bu.ac.bd/uploads/BUJ1V4I1/13.%20Hashinoor.pdf

Industrielle Supply (ISPO). (2024, August 5). How to reduce the textile industry's water footprint. *ISPO*. https://www.ispo.com/en/news/trends/how-textile-industry-reduces-its-water-footprint

International Collective in Support of Fishworkers. (n.d.). India and Bangladesh: The downstream implications of a water conflict underscore the need for better regional cooperation. https://icsf.net/newss/india-and-bangladesh-the-downstream-implications-of-a-water-conflict-underscore-the-need-for-better-regional-cooperation/

Islam, M. S. (2025, March 20). Teesta water withdrawal impact on north. *New Age*. https://www.newagebd.net/post/opinion/260469/teesta-water-withdrawal-impact-on-north

Li, F., Guo, Z., Mao, L., Feng, J., Huang, J., & Tao, H. (2023). Impact of textile industries on surface water contamination by Sb and other potential toxic elements: A case study in Taihu Lake Basin, China. *International Journal of Environmental Research and Public Health, 20*(4), 3600. https://doi.org/10.3390/ijerph20043600

Liu, X., Li, Y., Wang, L., Gong, J., Sheng, Y., & Li, Z. (2025). The analysis of hydrometeorological characteristics in the Yarlung Tsangpo River Basin. *Water, 17*(3), 344. https://doi.org/10.3390/w17030344

Manhas, N. S. (2025, February 6). China's Medog county mega-dam is bad news for India and Bangladesh. *The Lowy Institute*. https://www.lowyinstitute.org/the-interpreter/china-s-medog-county-mega-dam-bad-news-india-bangladesh

Master, F., & Shen, S. (2025, July 21). China embarks on world's largest hydropower dam, capital markets cheer. *Reuters*. https://www.reuters.com/sustainability/climate-energy/china-embarks-worlds-largest-hydropower-dam-capital-markets-cheer-2025-07-21/

Nahar, N., Haque, M. S., & Haque, S. (2024). Groundwater conservation, and recycling and reuse of textile wastewater in a denim industry of Bangladesh. *Water Resources and Industry, 31*, 100249. https://doi.org/10.1016/j.wri.2024.100249

New Age. (2024, July 21). Bangladesh retains rank of 2nd largest RMG exporter. *New Age Bangladesh*. https://www.newagebd.net/post/apparel/269421/bangladesh-retains-rank-of-2nd-largest-rmg-exporter

Olson, K., & Frenelus, W. (2024). Environmental and human impacts of Lancang-Mekong mainstem and tributary dams on China, Laos, Thailand, Myanmar, Cambodia, and Vietnam. *Open Journal of Soil Science, 14*, 555–605. https://doi.org/10.4236/ojss.2024.1410029

Palash, W., Bajracharya, S. R., Shrestha, A. B., Wahid, S., Hossain, M. S., Mogumder, T. K., & Mazumder, L. C. (2023). Climate change impacts on the hydrology of the Brahmaputra River Basin. *Climate, 11*(1), 18. https://doi.org/10.3390/cli11010018

Patel, H., & Vashi, R. T. (2015). *Characterization and treatment of textile wastewater*. Elsevier. https://doi.org/10.1016/C2014-0-03542-6

Paul, R., & Johora, F. T. (2025, July 9). After US tariffs, jobs hang by a thread in Bangladesh's garments sector. *Reuters*. https://www.reuters.com/business/world-at-work/after-us-tariffs-jobs-hang-by-thread-bangladeshs-garments-sector-2025-07-09/

Pradhan, N. S., Das, P. J., Gupta, N., & Shrestha, A. B. (2021). Sustainable management options for healthy rivers in South Asia: The case of Brahmaputra. *Sustainability, 13*(3), 1087. https://doi.org/10.3390/su13031087

Prashad, P. S. (2024, September). Driving towards a sustainable future in Bangladesh: Textile industry and water pollution. *Pshyamprashad Blogspot*. https://pshyamprashad.blogspot.com/2024/09/driving-towards-sustainable-future-in.html

Raff, J. L., Goodbred, S. L., Pickering, J. L., et al. (2023). Sediment delivery to sustain the Ganges-Brahmaputra delta under climate change and anthropogenic impacts. *Nature Communications, 14*, 2429. https://doi.org/10.1038/s41467-023-38057-9

Ranjan, A. (2020, August 6). China's hydropower projects on River Brahmaputra: Implications for India and Bangladesh. *Institute of South Asian Studies, National University of Singapore*. https://www.isas.nus.edu.sg/papers/chinas-hydropower-projects-on-river-brahmaputra/

Rao, M. P., Cook, E. R., Cook, B. I., et al. (2020). Seven centuries of reconstructed Brahmaputra River discharge demonstrate underestimated high discharge and

flood hazard frequency. *Nature Communications, 11*, 6017. https://doi.org/10.1038/s41467-020-19795-6

Reuters. (2024, August 30). Bangladesh garment industry short on cotton as floods worsen protest backlog. *The Business of Fashion*. https://www.businessoffashion.com/news/global-markets/bangladesh-garment-industry-short-on-cotton-as-floods-worsen-protest-backlog

Ridwan, A. D., & Idris, N. I. (2025). Dampak pembangunan bendungan di Tiongkok terhadap keamanan pangan negara-negara hilir Sungai Mekong. *WISSEN: Jurnal Ilmu Sosial Dan Humaniora, 3*(2), 273–283. https://doi.org/10.62383/wissen.v3i2.791

Ruochen, J., Zhang, L., Peng, M., Lu, W., Peng, D., Xiao, S., & He, X. (2025). Amplified risks of the Yarlung Zangbo–Brahmaputra River to glacier hazard chains due to multi-hazard transformation. *Engineering*. https://doi.org/10.1016/j.eng.2025.07.002

Shaik, E., & Fan, D. (2025). Changes in runoff and sediment discharge and their influencing factors in the lower Brahmaputra River, Bangladesh. *Journal of Hydrology, 662*(Part A), 133924. https://doi.org/10.1016/j.jhydrol.2025.133924

Shammi Haque, M., Ali, M. M., Islam, A. K. M. S., & Khan, J. U. (2021). Changes in flow and sediment load of poorly gauged Brahmaputra river basin under an extreme climate scenario. *Journal of Water and Climate Change, 12*(3), 937–954. https://doi.org/10.2166/wcc.2020.219

Shuvo, A. H. (2025, July 29). China's new mega-dam: Should upstream ambitions concern Bangladesh? *The Business Standard*. https://www.tbsnews.net/features/panorama/chinas-new-mega-dam-should-upstream-ambitions-concern-bangladesh-1200056

Siddiqi, D. M. (2025, March 26). What's happening in Bangladesh's garment industry? *The Economics Observatory*. https://www.economicsobservatory.com/whats-happening-in-bangladeshs-garment-industry

Smith, T., & Bookhagen, B. (2018). Changes in seasonal snow water equivalent distribution in High Mountain Asia (1987 to 2009). *Science Advances, 4*(1), e1701550. https://doi.org/10.1126/sciadv.1701550

South China Morning Post. (2025, May 2). Explainer | China is building the world's biggest hydropower dam. Why is India worried? https://www.scmp.com/news/china/science/article/3319175/china-building-worlds-biggest-hydropower-dam-why-india-worried

Stockholm International Water Institute. (2017). *Water governance mapping report: Bangladesh*. https://siwi.org/wp-content/uploads/2017/06/Water-governance-mapping-report-Bangladesh.pdf

Swisscontact. (2022, March 22). *World Water Day 2022 – Groundwater depletion: Unearthing the invisible crisis*. https://www.swisscontact.org/en/news/world-water-day-groundwater-depletion-unearthing-the-invisible-crisis

Textile Learner. (2024, February). *Depletion of groundwater level by textile and RMG industry*. https://textilelearner.net/depletion-of-groundwater-level-by-textile-and-rmg-industry/

Uddin, M. A., Begum, M. S., Ashraf, M., Azad, A. K., & Adhikary, A. C. (2023). Water and chemical consumption in the textile processing industry of Bangladesh. *PLOS*

Sustainability and Transformation, 2(7), e0000072. https://doi.org/10.1371/journal.pstr.0000072

UN ESCAP. (2021). *Mainstreaming inland waterways into national logistics network: The case of Bangladesh*. United Nations Economic and Social Commission for Asia and the Pacific. https://repository.unescap.org/bitstream/handle/20.500.12870/4077/ESCAP-2021-WP-Mainstreaming-inland-waterways-national-logistics-network-Bangladesh.pdf?isAllowed=y&sequence=1

Wentzell, A. (2013, December). The Brahmaputra River, inter-state conflict and climate change (ICE Case Study No. 295). *Inventory of Conflict and Environment (ICE)*. https://mandalaprojects.com/ice/ice-cases/brahmaputra-bangladesh.htm

Wong, T. (2025, July 21). China begins building world's largest dam, fuelling fears in India. *BBC News*. https://www.bbc.com/news/articles/c4gk1251w14o

Yagay, & Sun. (2025, March 3). Zero liquid discharge (ZLD) – An introduction [Environmental laws]. *TaxTMI*. https://www.taxtmi.com/article/detailed?id=13700

Zaniolo, M., Giuliani, M., Sinclair, S., Burlando, P., & Castelletti, A. (2021). When timing matters—Misdesigned dam filling impacts hydropower sustainability. *Nature Communications, 12*(1), 3056. https://doi.org/10.1038/s41467-021-23323-5