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Teesta Barrage Effects and Water Sharing with India: A Bangladeshi Riparian Area Study

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Abstract

Any future debate must include a discussion of water. There are many rivers in Bangladesh, but 54 rivers that originate in India. The Teesta is an excellent example. The Teesta River has two barrages for irrigation purposes, one in India's Gajaldoba and Bangladesh's Doani. This paper aims to assess the effect of the Teesta Barrage on the people who live along the river's banks in Bangladesh. Aside from that, we're working to find solutions to the Teesta River water-sharing problem, as well as the fifty-four other rivers that Bangladesh and India share. This article examines several international sharing and inter-state water resource ideas (Prior appropriation theory, Regional ownership theory, Spontaneous flow of water theory, Decentralized consensus theory, Public benefit theory, Fair use theory, etc.). Using a qualitative method, we collected data and information from primary and secondary sources. This research was carried out using the case study method, which includes in-depth interviews.

Keywords: Teesta Barrage, Water Sharing Issues, Effects, The Riparian Area

Introduction

Water is necessary for survival, health, and growth. However, one in every three people lacks access to safe drinking water (Allan: 1999). By 2025, the UN estimates that almost 2 billion people will be water-scarce, and two-thirds of the world's population will be water-stressed (Irina & Henk: 2016). Water scarcity and the inability to respond to climate change are, predictably, top global worries (World Economic Forum in Davos, 2016). Every conversation about agriculture, energy, public health, transportation, the environment, and the future should include a discussion about water.

The Teesta River flows from the Teesta source Glacier-Pauhunri Glacier to Khangchung Lake (27.590N; 38.480E) in the Eastern Himalayas of Sikkim, India (Hanif:1995). The Teesta (Trisrota/ chumbu chu/ chhombochho/ three channels) rises from the Pauhunri Glacier and flows through the Darjeeling ridge (20000–24500/610–747 m m.a.s.l). It's approximately 100 miles/160 kilometers long. It then drains into the Brahmaputra River at Chilmari Thana, in the hamlet of Kamarjani (Mukhopadhya: 1982). One hundred miles (170 kilometers) of Bangladesh's 250 kilometers are accounted for the country (Hanif:1995). Almost all Sikkim, India's Darjeeling district, and northern Bangladesh are included in the catchment region. The Teesta River

flows south from Jalpaiguri, India, through Karotaya, Punarbhaba, and Atrai. The goddess, Parvati's breasts, is believed to be the river's source (Rahman et al., 1994). On the Teesta River in Bangladesh, a barrage was built for irrigation reasons. We are aware that the optimum functions of the Barrage may be guaranteed by ensuring the water supply at all times. However, it is sometimes hindered to upstream (Indian side) water regulation. As a result, the Teesta riparian zone sometimes has excessive water due to flash flooding and occasionally experiences water shortages. In this paper, we are attempting to describe the effects of the Teesta Barrage on the people who live in its riparian zone and the problems surrounding water sharing with India. Finally, we propose several feasible remedies to the Bangladesh-India water dispute.

Background

Until 1787, the Teesta supplied water to the Karatoa, Atrai, Jobuneshwari, and other rivers. The Karatoa population declines as a result of structural changes in Barind. Teesta was unable to cross the Atrai. In 1787, heavy rains washed away large portions of Rangpur. The downpour hit on August 27, 1787. That year's floods killed almost a sixth of Rangpur's population (Verghese: 1990). The Teesta found a new outlet and has stuck with it. Several sluggish cut-off rivers, such as Mara (dead), Buri (ancient), Chara (Beel), etc., 177 km long, 300–550 m broad (Islam: 2016).

Bangladesh and India planned to irrigate about 16 lakh (1.6 million) hectares of land, the West Bengal government said. The river carries just around 100 cumecs or about one-eighth of the total water demand in both nations (Basu: 2017). The Teesta has a barrage at Gajaldoba, West Bengal, in the Jalpaiguri district. Teesta River in Bangladesh takes a shower near Doani in the Lalmonirhat district. The Teesta's water level fell below 100 cumecs in April and May. (Basu: 2017). In July 1983, the Teesta Accord was signed. It granted India 39 percent of the water and Bangladesh 36 percent while releasing the remainder. However, it was just for two years. The issue has become more complex due to a steady decrease in water flow, especially during the summer. Similar shares have been proposed in subsequent agreement versions, although they are still drafts. Of course, the political dispute between India's Prime Minister Narendra Modi's Bharatiya Janata Party (BJP) and West Bengal Chief Minister Mamata Banerjee's Trinamool Congress adds to the confusion. They visited Dhaka in 2015 to announce progress on the Teesta agreement, Mamata Banerjee did not support to progress it. Now the BJP-Trinamool relationship has hit rock bottom. This rivalry began before Modi became PM. Former Prime Minister Manmohan Singh encouraged Mamata Banerjee to sign a Teesta water-sharing agreement in 2011. The Chief Minister backed out of the contract.

Hundreds of villages around the Teesta River, it would affect millions of people in these areas. Around 21 million Bangladeshis live off the river in some way. India controls most of Teesta's water (Sundeep & Ilmas: 2013). Hydroelectric installations have long used the Teesta's rushing waters, mainly in Sikkim and West Bengal. Thirty major hydropower projects totaling 5,000 megawatts are planned for the Teesta. Only Sikkim has six. The Massive dams divert river flows into powerhouses before continuing downstream (Amit: 2017). Tenders were invited for the massive Teesta Barrage Project. This project constructed barrages in Gajaldoba and two other sites. As part of India's river-linking project, the Teesta river will transport water from Himalayan and peninsular rivers to drought-prone regions farther south through dams and canals (Ipsita: 2017).

Because water resources are state-owned, no deal may be signed or implemented without West Bengal's approval. The Indian Constitution (Article 253) empowers the Indian central government and parliament to execute any treaty, accord, or convention as well another country. So, if the feds want to sign a Teesta water deal, the state can't refuse (Khalequzzaman: 2017). But what is a fair Teesta water treaty? Bangladesh has prioritized Teesta water for ecosystems and a vast economy. Moreover, both India and Bangladesh share the Teesta watershed. Residents of West Bengal/Sikkim and Bangladesh should be represented in the Teesta Treaty. It should be based on the flow before Gajaldoba and Dalia Barrages. Several studies found that the river's ecosystems need 3,200 cusecs of water flow year-round, and the same for Bangladesh and India. Also, no transaction will work without a guarantee (Khalequzzaman: 2017).

It is necessary to have a comprehensive knowledge of the social, cultural, economic, environmental, and political situations. Water diplomacy encourages international collaboration on water availability, distribution, and usage by governments and non-state actors (Irina & Henk: 2016). Determine the variables that affect water cooperation at various levels. The meetings may be formal or unofficial, sponsored by civil society organizations. In these meetings, seeking facts and engaging third parties is critical to foster the discourse on which commonality and understanding are anticipated to develop.

Universal cooperation is promoted through the UN Watercourses Convention of 1997 and the 2008 Draft Articles on Trans-boundary Aquifer Law. It states that "Watercourse countries should collaborate based on sovereign equality, territorial integrity, mutual benefit and good faith" (Rieu C et al., 2012). Informed consent and consultation are part of the broader responsibility to collaborate.

Objectives

The research's main goal is to look at the effects of the Teesta Barrage on the people who live along its banks in Bangladesh. The following are the paper's broad objectives:

- To learn about the Teesta Barrage beneficial and the negative effects on Bangladesh's Teesta riparian region.
- To explain the effect of the Teesta Barrage on the Teesta's riparians when India regulates the river's natural flow.
- To come up with some ideas on how the Barrage may be beneficial to riparian areas at all times without causing damage.
- To collect information on the Teesta Barrage and the Teesta riparian area for researchers who are interested in the subject.

Methodology

The research collected data and information from primary and secondary sources using a mixed-method approach. This study utilized a case study approach to enable in-depth interviews. The research is qualitative in nature. Twelve in-depth interviews were conducted to complete this research. The research necessitated interviewing, local people throughout the Teesta River's riparian zone in Bangladesh. Respondents were educated and mature, as shown on their insightful responses. The data for this study came from the hamlet of Sarkerpara, Chotokhata, in the Nilphamari (the West Side of the Barrage) District's Dimla Upazila. Doani is a

village in Bangladesh's Hatibandha Upazila, Lalmonirhat District (the East Side of the Barrage). Collect information from both the Up and Down Sides of the Barrage; this study was interviewed along a water specialist, an ambassador/high commissioner, and the respective Bangladeshi and Indian think tanks.

Secondary data was gathered beyond analyzing relevant books, research papers, journal articles, government reports, speeches, daily newspapers, and online sources. The gathered information was verified on cross-checking it with other data and secondary sources.

The Review of Literature

The research looks at several academic publications on the present issue (Islam: 2016, Sundeep & Ilmas: 2013, Huntjenset P, al.: 2016, Mirchandani: 2016, Rieu C, et al.: 2012). In his work 'Water Use and Poverty Reduction,' the author, Islam (2016), examines the link between water accessibility and hardship depletion in the Teesta Basin. The book's findings include background information on the Teesta River, its spatial-physical nature, geomorphic and hydrological characteristics, irrigation, and the water delivery system through India's Gajaldoba and Dalia barrage's Bangladesh, as well as the development of a bilateral water-sharing model.
In their study "Water Cooperation for a Secure World," Sundeep and Ilmas (2013) look at the connection between water and security using 205 shared river basins and 148 nations. This study recommended a variety of positive efforts for both riparian and global residents, including tourist attractions, the hydropower, the mariner, integration, and extra adversity, to name a few. It will eventually lead to peace and security between the two nations and efforts in water shuttle diplomacy.

Again, Sundeep & Ilmas (2013) documented the whole history of the Teesta River and its economic importance for Bangladesh and India in their project 'Rivers of Peace: Restructuring India Bangladesh Relations.' The article focuses on the Teesta River agreement's issues and remedies. The research effort yielded several suggestions for reshaping Bangladesh's relationship with India. The Blue Peace study also advocates for collaborative, comprehensive, and long-term solutions to cross-border water issues.

According to Huntjens P, et al. (2016), the inter aquatic diplomatic structure helps academics comprehend cooperation over the shared waters in their article 'The Multi-Track Water Diplomacy Framework: A Legal and Political Economy Analysis for Advancing Cooperation over Shared Waters.' It will aid governments, and other interested parties overcome barriers to collaboration, make collaborative or joint investments in shared river basins, and settle local or community-based conflicts.

Maya M (2016) detailed the flow history of the Teesta River in an ORF special report on 'the Teesta Water Dispute Geopolitics, Myth, and Economics,' which was broadcast on April 25, 2016. Throughout her work, she has provided a comprehensive picture of the Teesta Water Dispute and the geopolitical and economic importance of the Teesta River among Bangladesh and India.

Laws and concepts regulating international watercourses were detailed along Rieu C, et al. (2012) in the 'UN-Water Courses Convention User's Guide.' As a worldwide frame mechanism, its primary goal is to supplement local the basin (cross-basin) and sub-basin accords. As a result, the Conference offers a lot of promise to resolve the current legal framework for international watercourses, which is frequently characterized as fragmented.

Water security was detailed in the IDSA Task Force Report (2012), 'Water Security for India: The External Dynamics.' The Importance of Water in the Context of National Security examined India's water predicament and critiqued certain aspects of their water management strategy. Following a regional riparian assessment, a targeted examination of India's water-related issues with Pakistan, China, Bangladesh, Nepal, and Bhutan is conducted. The research ends with several well-considered recommendations.

The International Law Association (ILA) Helsinki, Finland, published the Helsinki Water Uses Regulations in August 1966 as an internationally recognized standard guideline on how watercourses and associated land waters that may be used and modified across national borders. The Helsinki Rules are divided into six chapters and 37 articles. It was superseded in 2004 on the Berlin Water Resources Rules, which led to the United Nations Convention on the Non-Navigational Uses of International Watercourses being established (1997).
The Berlin Water Resources Rules are a document authorized by the International Law Association (ILA) that summarizes Global Regulations commonly applied to freshwater resources, whether inside or outside state boundaries. The paper, adopted on August 21, 2004, in Berlin, supersedes the ILA's earlier Helsinki Rules on international river use, restricted to international drainage basins and related aquifers.

The United Nations Convention on Non-Navigation Use of International Watercourses (1997) mandates the countries participate in environmentally-friendly river development, management, and preservation. The United Nations created the document to help present and future generations conserve and manage water resources. From the time it was written to when it went into force on August 17, 2014, the Convention took more than 17 years. Thirty-six countries have only ratified the Treaty. However, many nations have claims based only on their governments, interests, and assessments and are attempting to reach a stimulating and antagonistic agreement. Nonetheless, the Convention is an essential step in developing international water law.

Above and beyond the debate of the whole Literature Review, we know the history and conflicts of the Teesta River. Academics are described in the International Laws and Water Sharing Conventions. Some writers propose a suitable model to resolve the water-sharing issue between Teesta. Still, in our research, we are trying to find out the views of the Teesta Riparian people regarding the remediation of the Teesta Dam and the water allocation issues among Bangladesh and India.

The Research's Importance at the National and Local Level

To share trans-boundary river water, the Agenda for Sustainable Development 2030 required cooperation. Related nations need more intensive training and more transparent rules emphasizing innovative approaches to resolving global water-related disputes.

90% of northern Bangladesh's population is dependent on Teesta water for agriculture. Due to water scarcity and agricultural damage caused by sudden flash floods, farmers are forced into scarcity. The Teesta Barrage project was a real vision for the poor who hoped for a brighter future (Islam: 2016). From December to March, the Teesta's flow is critical for Bangladesh since the water flow frequently drops to fewer than 500 cusecs from 5,000 cusecs. During the rainy season, India opens all gates of the Gajaldoba Barrage, resulting in a flash flood in Barrage's bottom. The majority of the communities were flooded at the time. Houses, roads, and crops were all devastated by the flood. Bangladesh needs to build a pact similar to the Ganges Treaty to manage this severe

water flow in Teesta during the dry and rainy seasons. We went to the riparian region to see how important it is. We attempted to grasp the villagers' perspectives and see how they were affected beyond Teesta's tremendous water flow during the dry and wet seasons.

In September 2011, Prime Minister Manmohan Singh's visited Dhaka due to last-minute opposition from West Bengal Chief Minister Mamata Banerjee. Manmohan Singh's Government could not conclude any new agreement as they had taken Trinamool Congress's support for forming the Government, and Mamata Banerjee refused to support any further talks on Teesta water sharing. The Teesta river water sharing the issue gets the news whenever a high-level bilateral or talks visit between India and Bangladesh. PM Sheikh Hasina visited India in 2017, and 2019 and PM Narender Modi visited Bangladesh in 2015 and 2021. Many agreements were made on various cooperation issues, the Teesta water-sharing problem, however, is not one of them. PM Modi has promised that the long-standing Teesta water-sharing dispute would be addressed shortly. This research is necessary because millions of riparians livelihoods are related to these issues. After analyzing the problems, we tried to give up some solutions.

Theoretical Framework

There are many ideas on how to share international and interstate water resources. Explain the following strategies:

- Prior Appropriation Theory: This theory holds that water in its natural condition belongs to the public and cannot be privately held. The Appropriation and proper application are two ways to acquire the right to use water. Consequently, the first user creates a prior right to actual water use as the basis and limit of use (Jain & others, 1971).
- Territorial Sovereignty Theory: This theory holds that the riparian state has full authority over the rivers that flow through its territory, with no regard for the rights of other co-riparian, such as the lower co-riparian. Consequently, no riparian state, in this perspective, has the right to demand continuous water flow from adjacent states. This concept takes a one-sided extreme stance, asserting that riparian countries have exclusive or sovereign rights over the water flowing through their borders (Ibid).
- The Territorial Integrity Hypothesis: Also known as the "natural water flow theory," this hypothesis is based on the concept of territorial integrity. This viewpoint believes a river to be a part of the state's territory. This theory holds that every lower riparian has a legal right to the river's natural flow, unaffected by the upper riparian owners. If the higher state blocks the flow, the lower riparian state's geographic rights will be infringed. Consequently, under this concept, the higher riparian owner must allow the river to run in its natural flow and course. The higher riparian utilizes, the lower riparian's domain in its area for lawful purposes (Ibid).
- Equitable Apportionment Theory: The 'Equitable Apportionment' theory theoretically includes the following components. Fair apportionment refers to competing units having equal rights to use the basin or interstate waterways in question. Second, equal ownership does not entail a right to a proportionate amount of Water. It refers to each co-basin or co-riparian state's right to participate in the watershed or cross waters depending on various criteria, such as domestic, societal, and financial requirements and the obligations of many other crosses co-riparian or relevant countries. Finally, this is

an excellent suggestion. The fourth principle, equitable distribution, considers the beneficial usage of the rivers in the issue. Fifth, conserving Water for future users, while present users are unhappy would be irrational and contradictory to the concept of fair distribution. (Ibid)

- The Community of Interest Theory: This theory treats the total basin as a unique economic entity, disregarding the basin States' political boundaries or the administrative divisions in a federal setup about a particular basin, interstate river, or river valley, as the case may be. As a consequence, the many rivers are seen as belonging to the whole community. Of course, for their usage and development, the co-riparian or concerned States must share the concerned waters. This concept implies that dams or other planned works will be built in the most suitable site as part of an integrated river development program, or, to put it another way, a water resource development program. As a consequence, the beneficial advantages are distributed among the co-riparian or neighboring States that need them.
- Equal Utilization Theory: This theory states that each Basin State has a fair and inside the boundaries of an international drainage basin, an equal share of the beneficial uses of the waters is distributed.

After studying these concepts, we can see that India governs the Teesta's water using the Prior-appropriation and Territorial Sovereignty theories. As a consequence, Bangladesh is deprived of water when it is most needed. India has the option of storing or releasing water as it sees appropriate. If India followed the Natural Water Flow Theory, the Teesta River in Bangladesh would never dry up or flash. Aside from that, the Community of Interest Theory and the Equitable Utilization Theory will help Bangladesh and India establish a sustainable Teesta water-sharing agreement.

The Teesta Barrage in Bangladesh

In Bangladesh, the Teesta Barrage project began in 1979 and was completed in 1997-1998. It is Bangladesh's most important irrigation project. It is located on Doani in the Lalmonirhut District of Bangladesh's Rangpur Division. Nilphamari, Dimla, Jaldhaka, Kishoreganj, Saidpur, Rangpur, Taraganj, Badarganj, Gangachara, Parbatipur, Chirirbandhar, and Khanshama were among the Upazilas involved. The project was supposed to be finished in two stages. The project's first phase was completed in 1998. The total command area of phase I (restructured) is 7,50,000 hectares, Irrigable 5,40,000 hectares and under irrigation land covers 111,406, hectares (Arfanuzzaman, 2020). The Barrage's major components include the Canal Head Regulator, the Flood Control Dam, the Main Canal, Major Secondary Canal, the Secondary Canal, the Tertiary Canal, Irrigation Structure Culvert, Drainage Structure, Field Turnout, Inspection Road, and Project Road. It's a 615-meter-long concrete structure with 44 radial gates with a discharge capacity of 12,750, cumecs (Sarker et al., 2011). The remaining land will be developed as part of phase II, which is now under development. “There are plans to put 79,000 hectares of land under this irrigation project in the three districts,” said Dalia Division Water Development Board Executive Engineer Abdullah Al Mamun. It will be determined by the availability of river water flowing upstream” (The Dhaka Tribune, 2019). The total cost of the Barrage was just 800.00 lakhs (Bangladesh Water Development Board).

In India's Teesta Barrage is located at Gajaldoba in the Jalpaiguri District of West Bengal, India, in the Mal CD Block of Malbazar Subdivision. The Barrage's primary function is to provide Irrigation to six Indian regions in the north. Construction on the Gajaldoba Teesta Barrage began in 1983 and was completed in 1990. The total

Command Area is 12,14,000 hectares; under the irrigable Area is 9,22,000 hectares, and Under the irrigation Area is 5,44,000 hectares (Arfanuzzaman, 2020). That Barrage cost a total of 1500 crore Taka (The Daily Star, January 4, 2010).

The Teesta river basin has a total area of 12,159, square kilometers and is home to hundreds of communities. Any agreement would have a major effect on the lives and livelihoods of the millions who live in these areas. In Bangladesh alone, over 21 million people depend on the river for their livelihoods, either directly or indirectly. India, essentially regulates the quantity of water accessible to Bangladesh as the upper riparian country (Sundeep & Ilmas: 2013). The Teesta's rushing waters have been harnessed for large hydropower projects in the upper catchment areas of Sikkim and West Bengal throughout the years. The river is diverted in various places for the irrigation project.

Collection and analysis of data

We gathered data from secondary sources, but we went to Teesta's riparian section to collect data from primary sources to gain a more accurate picture of the problem. We employ a case study methodology that includes an in-depth interview. To determine the effects of the Teesta River Barrage and the Water Sharing Problem with India, we used Purposive Sampling. The study involved a total of twelve participants. We got their consent to use the information in the study. We employed an unstructured interview questionnaire to obtain data. We collected data from mid-February to mid-March. This time, the Teesta's water was only up to the knees. For a hundred kilometers, the riverbank was scattered with sand. During the rainy season, we saw roads and homes being damaged and fields and roadways being smashed a sudden gush of water. We gathered data from the Barrage's four sides and divided it into four categories. We have analyzed the data by narrative analysis and present it in the following ways:

a. The First Category (Upper Barrage or the South side of the Teesta Barrage)

The majority of respondents in this category claimed that the Teesta River's original water level dropped by the day. The river overflows during the wet season, but runs dry during the dry season. In a period of water scarcity, Teesta Barrage is thus a boon to them. There are no floods in their area since they have constant access to the Barrage's stored water, which aids the growth of a variety of crops such as rice, maize, wheat, onion, garlic, potato, mustard, and others. As a result, it positively impacts the local economy and improves farmers' quality of life. Before the Teesta Barrage provided them with water, they couldn't grow such crops. Several arid places, such as Mora Danga and Shukno Danga, came back to life once the Teesta Barrage was built. Rice has grown at a rate of 20 to 25 tons per acre. The majority of them claimed that the Indian government should improve water flow during the dry season. The Indian government can tackle the issue of water sharing.

b. The Second Category (Lower Barrage or the South side of the Teesta Barrage)

The Teesta River used to be passable by boat 20 to 25 years ago, but it is now practically dry in the winter, according to the majority of the participants of the Teesta barrage's lower reaches. The Teesta barrage would have little effect on their agricultural output in this region. Water availability may be ensured through public awareness, shallow machine, and other techniques, resulting in increased crop productivity on this site. "The Teesta Barrage is a Tiger that swallows everything," they said, expressing their viewpoint. As a result, when the Barrage Gate is open (when India releases its extra water), too much water washes everything away, and when

the Gate is closed (during the winter or the dry season), water is scarce. The majority of respondents blamed the Indian government for their current predicament. The Indian government should take the required measures to ensure that the Teesta River has enough water.

c. The Third Category (the East side of the Teesta Barrage)

There was a roar of water in Teesta 20 or 25 years ago, but it is now dead, according to responses inside the east side of the Teesta Barrage. The Teesta River's flow is falling by the day. During the winter, water flows drop by 400 to 500 cusec. The river has suffered dramatically due to excessive water at times and insufficient water at other times. During the wet season, the entire Barrage's gates open, causing damage. Roads were washed away, homes were destroyed, and crops were destructed. Life is full of sadness at the time. The rate of deterioration in Hathibandha is higher than on the opposite bank of the Teesta. Agriculture is growing in this area, although it is due to people's supplemental irrigation services rather than the Barrage's blessing. The Barrage did not provide them with any facilities. They have to pay to irrigate their farm. They claimed that the Indian government should help to build appropriate water management systems.

d. The Fourth Category (The west side of the Teesta Barrage)

The Chief Respondent for the west side of the Teesta Barrage stated that water was available before establishing the Barrage. Water is abundant from the fall through late autumn, but it is rare in the winter and summer. In their village, flooding was a common occurrence. There have been no floods in this area since the Teesta Barrage was built. They assert that crops thrive in the winter when water is scarce and that increased char, dense with silt, triples or quadruples crop productivity. They argued that the Indian government could rectify Teesta's water deficit; if the Indian government does nothing, the water level will not rise; therefore, they have nothing to do.

Findings

The influence of the Teesta Barrage and water-sharing issues with India is the key theme of this study. Following a discussion with all responders, most participants agreed that the Teesta River had robust water flows before the construction of the barrage but mild water flows afterward. The majority believed that they could handle the Teesta River's water system in the manner that India desired. The Barrage function increased the Teesta riparian area's productivity.

The respondents on the upper side of the Teesta Barrage agreed that the Teesta Barrage had blessed them with irrigation since the Barrage could not achieve its objective due to a lack of water during the dry season. The top side of the Barrage receives all of the advantages. They have adequate water to grow in any season, rainy, winter, or summer. They also cannot risk being destroyed beyond a flood. When the water level on this side rises too high, the barrage gates are open, and the surplus water is discharged. The West side of the Barrage is also fortunate with the Barrage and suffers more diminutive than the East and lower side. They do not suffer from flood water because flood water recedes quickly, and they may cultivate various kinds of crops in silty mud, which grows better than other areas.

The downhill and the Eastside inhabitants of the Barrage are suffered the most. There is too much water in the rainy season, and there is not enough in the winter. They are dealing with a water shortage as well as flooding

issues. The overall flow of the water was 300 to 500 cusec from February to April. Many individuals in this region of the Barrage irrigate their property using their unique arrangements, such as a Deep Tube well or a Shallow Machine. It is also expensive at the same time. During the rainy season, India released Water into Bangladesh (the Downside of the Barrage), causing the Gajaldoba Barrage to flood. Highways, houses, and farmland were all wrecked havoc by floods. In this region, most people become homeless, and domestic animals suffer significantly as a consequence. Flash floods carried large quantities of sand and silt, destroying the fertile soil. In silty mud soil, paddy does not thrive. Bangladesh needs the Treaty to have access to readily accessible water. The federal government and the state government of West Bengal are unable to reach an agreement. Aside from economics, this issue has a political component. As a result, the Treaty cannot be signed. The river's lower-side farmers in both nations are suffering greatly. A minimal e-flow was also required for the river to survive. The Indian government also undertakes many projects by diverting Teesta's Water but does not provide Bangladesh with any statistics or information. It is illegal under international law.

According to the Indian Constitution (Article 235), the central government can pass laws covering the whole or a part of India's territory to carry out any treaty, agreement, or convention to another country. The federal government wants to sign a Teesta water-sharing agreement, and the state administration will find it almost difficult to reject without West Bengal's involvement.

However, the Teesta riparian zone is home to about 50:50 of India and Bangladesh population. As a result, when the Teesta Treaty is drafted, the following three parties should be given priority:

a. Ecosystems,
b. West Bengal/Sikkim residents,
c. Residents of Bangladesh's riverfront area.

Recommendations

After the findings of this research, we saw the effects of Barrage are optimistic as if the water supply is available. To ensure water supply Bangladesh and India needs a treaty like The Ganges treaty. The Bangladesh government should take some initiatives. The initiatives are as follows:

a. The Reservation of rainy season's Water

To get the benefit of the Barrage needed all time water supply. For that reason, Water should be store. Bangladesh can build a giant reservoir to store the Rainy season water. It can be controlled adequate and inadequate water situations; it also helps villagers' suddenly flash flood. China proposed building a pool in this area, but India did not support it. India's security issues blocked this project as India is near this project area. While Bangladesh should recognize India's security concerns as a good neighbor, India should also contribute to developing a comprehensive water management system in this area.

b. The Proper distribution of Water to the irrigation area

In India and Bangladesh, about 50:50 people live inside the Teesta watershed. In the interests of three stakeholders, the Teesta water should be shared. People reside in the watershed's Sikkim, West Bengal, and Bangladesh sections. Water should be distributed proportionately to the needs of Bangladeshi and Indian citizens. To put them in place, ensure that a) Teesta water is shared fairly, and b) everyone living in the riparian zone has legal and human rights. c) For fair sharing of the river's natural balance, International Laws and Principles may assist.

c. Increase reciprocal cooperation

Bangladesh-India relations have reached a new high in the last ten years. Bangladesh and India collaborate in various areas such as economic, political, cultural, education, research, training, and so on. India provides an $8 billion line of credit for economic growth. India has donated a 20 million dosage vaccination to Bangladesh in response to the Covid-19 Pandemic. Bangladesh also assists India with transit, trafficking, and the elimination of terrorism. As a result, each nation will understand its own needs, and many bilateral issues will be reduced. Bangladesh and India should exchange hydrological information. The 37th meeting of the Joint River Commission (JRC) was grasped in 2010, although there was no ministerial-level meeting. As a result, there should be frequent discussions on water sharing problems. A water expert meeting between the two nations should be organized. A unique political vision and strategy on the water issue and integrated research on trans-boundary water sharing issues should be developed.

d. The ecological equilibrium

We all know that every river must have minimum E-flows (environmental Flows); defined as water that sustains ecosystems and benefits humans inside a river, wetland, or the coastal zone. By ensuring e-flows, it is feasible to achieve ecological equilibrium. According to numerous studies, rivers need at least 3200 cusecs of water flow to sustain ecosystems, and rivers should be permitted to flow at any time of year.

e. Diplomacy

Track 2 and Track 3 diplomacy should be used to create an effective Teesta river water management system. Track two is unofficial, informal contact between members of the nation's opposition organizations, who have greater freedom to connect than high-ranking officials. Track three is individuals, civil society, and private organizations engage in diplomacy between individuals or basic-level diplomacy to promote community engagement and understanding.

f. Basinwise Water Management

Water demand and availability differ between the upstream and downstream sections of a river. In most cases, the upstream water flow exceeds the order, while the opposite is true. Creating appropriate river modeling based on water amount and quality may be the best option for balancing supply and demand. We can address flood, navigation, Irrigation, hydropower, and fisheries issues for a whole river's basin this way. Professor Dr. Ainoon Nishat, a hydrological specialist, said, "I will advocate for basin-wide management of our shared rivers, which is

also the current political directive. The river should be treated as a celebration inside the negotiations, to ensure the river's minimal environmental flow". Obstruction and pronouncement of water-related disputes are primarily studied results and analytical mediation, intervention, and propitiation based on a thorough knowledge of the demographic, artistic, financial, climatic, and governmental context. (Irina & Henk, 2016). "With dialogue, we (Bangladesh and India) can settle any contentious bilateral problems," Smurti S. Pattnaik, the Senior Research Fellow of IDSA, India, stated.

g. The International Law and Water Sharing Theory

The 1997 UN Watercourses Convention and the 2008 Draft Articles on the Law of Trans-boundary Aquifers highlight the universal need to cooperate in international water law. "The Watercourse States should collaborate based on sovereign equality, territorial integrity, mutual benefit, and good faith to achieve optimum use and appropriate protection of an international watercourse," according to Article 8.1 of the UN Watercourses Convention (Rieu C et al., 2012).

The Territorial Integrity theory, Equitable Apportionment Theory, Community of Interest Theory, and The Equitable Utilization Theory are appropriate for sharing Trans-boundary Water sharing issues. Bangladesh and Indian Water Experts should analyze these theories and apply that to resolve water sharing problems.

Conclusion

Water sharing problems are crucial because they relate to riparian economic, political, and cultural issues. There is massive consolidation and constructive affection between Bangladesh and India. Everybody should obey the International Laws and take necessary steps for the Trans-boundary River's water sharing, not only for the Teesta River but also other rivers which share Bangladesh and India. Nowadays, Bangladesh and India have passed the best consensual relation. We hope the Teesta Treaty will sign up soon. It's solving all problems. Analysis and recommendations of this study will consider in a positive way for finding the way forward to resolving issues. Farmers in the northern regions of West Bengal and Bangladesh would gain if the governments of both countries can reach an agreement. In the long term, two crucial sovereign nations in South Asia will seek a state-of-the-art to share and, hopefully, set an example for the rest of the region.

References

1. Arfanuzzaman Md. Upstream, downstream divergence, and hydro-socioeconomic distress in South Asia. Wiley, 2020. [Online], Available from https://onlinelibrary.wiley.com, [Accessed July 2021].
2. Bangladesh Water Development Board, Bangladesh. [Online] Available from https://www.bwdb.gov.bd/, [Accessed June 2021].
3. Fakrul I . Water Use and Poverty Reduction, Japan: Springer, 2016.
4. Irina B & Henk O. The Multi-track Water Diplomacy Framework: A Legal and Political Economy Analysis for Advancing Cooperation over Shared Waters, Netherland: The Hague Institute for Global Justice, 2016.
5. Jain S N, Jacob A & Jain S C, Inter-State Water Disputes in India, India: N.M.Tripathi Pvt. Ltd, 1971.
6. Khalequzzaman Md. What Bangladesh should demand from India, The Daily Star, 2017 [Online], Available from http://www.thedailystar.net/, [Accessed May 2021].

7. Maya M. (2016). The Teesta Water Dispute: Geopolitics, Myth, and Economics, Observer Research Foundation (ORF), [Online], Available from http://www.orfonline.org/research/teesta-water-dispute/, [Accessed July 2021].
8. Political Analysis of Teesta River Basin.The Asia Foundation, India: New Delhi, 2013.
9. Pinaki R and Rafiq S. Teesta flow in thin, The Daily Sta*r*, January 4, 2010.
10. Huntjens P. et al. The Multi-track Water Diplomacy Framework: A Legal and Political Economy Analysis for Advancing Cooperation over Shared Waters, Netherland: The Hague Institute for Global Justice, 2016.
11. Rahman, A et al. Environment and development in Bangladesh. Dhaka: University Press Ltd. (UPL), 1994.
11. Rieu C et al. UN Watercourses Convention, user's guide, Scotland: the University of Dundee, IHP-HELP Centre for Water Law, Policy and Science (under UNESCO), 2012.
12. Sundeep W & Ilmas F. Rivers of Peace, Restructuring India –Bangladesh Relation, India: Strategic Foresight Group, 2013.
13. World Economic Forum in Davos, 2016, [Online], Available from https://www.weforum.org/agenda, [Accessed May 2021].

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