Chapter 16
Dynamics of Transboundary River Conflicts vis-à-vis Nature Based Negotiated Approach (NBNA) Solution: Case Study River Teesta

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INTRODUCTION

As the population across the globe is rising, and in tandem the per capita consumption rate, the pressure on limiting environmental resources is also on the rise; which, in turn, is catering to the enhanced number of environmental conflicts in recent decades including the transboundary ones. According to a global environmental conflicts report, there were nearly 1800 such conflicts in 2018 (Temper et al., 2018). A 2020 study by Scheidel and Martinez-Alier mapped and analyzed 2743 such cases across the world in-between 2011 and March 2019, and found that such conflicts have been increasing with time. The report found that 95% of such cases happened after 1970; while 50% of the cases originated during or after 2008, a clear indicator of the trend (Scheidel et al., 2020).

A more recent mapping of such conflicts done through the dynamic Environmental Justice Atlas process (till January 13, 2021) documented 3342 environmental conflicts, out of which more than one-tenth (342) are located in India; highest for any country in the world. Overall South Asian region shows dominance in this regard having 13.3% of the global conflicts, though it occupies only 3.5% global landmass. Water issues, including those related to trans-boundary rivers, stand high in the list of environmental conflicts (EjAtlas, 2021).

According to EJAtlas, out of 3342 conflicts, water related issues with 693 conflicts (about 21%) is placed only second to land issues. Studies point out that global water withdrawal has nearly septupled over the last century, outpacing population growth by a factor of 1.7 (HDR, 2019); that further vindicates the rise of such conflicts. It is

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believed that unless the Nature Based Negotiated Approach (NBNA) is taken, particularly within countries having transboundary river or water conflicts, the situation will only worsen.

WATER CONFLICTS: HYDRO POLITICS OCCUPY THE PIVOTAL POINT

Almost every region of the world has water related conflicts including river related rifts within two or more countries. The rifts mainly occur over access and right to control the water resources and being largely driven by geopolitical interests. This is actually a historical trend as wide range of water conflicts had happened over the years as water is often considered synonymous with the development of any region. An exhaustive database about the water-linked conflicts, the Water Conflict Chronology, has been documented by the Pacific Institute that goes back nearly 6000 years; and clearly highlights the underpinning of politics in the process (Pacific Institute, 2019)

The recent trend is no different with water related conflicts becoming more frequent and formidable as hydro-politics, more specifically river related transboundary rifts, turning increasingly overt and louder; taking a pivotal position in the process. Gradual reduction of resources with increasing impact from climate change has further exaggerated and widened the rifts. In most cases, the upper and lower riparian river conflicts have been found to be dragging over years with no sustainable solutions found in absence of political willingness to settle the same.

The case in point is the Nile basin, which witnesses significant conflict within eleven riparian countries on Nile river water where the negotiations have reached a plateau since 2007 as a result of diverging interests between upstream and downstream countries. **Similarly, Turkey, Syria and Iraq have a running feud over the Euphrates-Tigris** that had been fed by, and also feeds, the inherent political tensions between the countries. Afghanistan's efforts to use Helmand River and the Harirud to support post-conflict reconstruction and development have sent warning signals to Iran, particularly to water security in its eastern and northeastern provinces, which share these rivers. The Mekong basin is also witnessing a mega expansion of dam-building for hydropower generation, especially in China and Laos; which has led to political tensions as lower riparian countries to the dams fear they will be facing several impacts like greater flooding to seasonal lack of water (Reliefweb, 2017). India, Bangladesh, Nepal and Pakistan also share various such transboundary river rifts.

On the other hand, Turkish-Armenian one is a unique and contrasting case study that underlines how political cooperation between two co-riparians can reduce the tension and lead to agreed share of transboundary waters (Altingoz and Ali, 2019).

The rift also operates in intra-country level. Southern states of India have been fighting over the rivers Kaveri (Mantri, 2018), and Krishna (Mohan, 2020) rivers and

the rift has not only widened over years but actually got sucked into political quagmire of the region. Competing parties moved to Judiciary for formalizing their rightful claim, as they believe, but judicial directives are unlikely to offer a sustainable way out to solve an issue; which needs socio-political intervention. There is similar discontent within Indian states about sharing Ganges water, and it is claimed that the state like West Bengal, which covers the end part of Ganga in India (called Hoogly river), actually even does not receive 2% of river water generated in Gomukh (the point where Ganges river is born) due to large scale water extraction and utilisation in upper part of Ganga basin that normally leads to significant horizontal disconnect in the main course of river during non-monsoon months (Basu, 2019).

It is felt that unless a holistic river usage policy is framed, considering and integrating social; economical; environmental and legal provisions, irrational and lopsided river use is set to continue being predominantly prodded by narrow political interests. While river politics mainly operates at macro-level, micro-level hydro politics has also been increasing rapidly whether it is about the use of ground water, provision of drinking water or maintenance of waterbodies and wetlands; which, often, feeds to rivers.

In fact, sustenance of natural resources, generally, is hardly considered important by a large section of political leadership, administration and society *per se*; with the financial return, albeit illegal, often proving the driver behind the indifference of a section of decision makers. This, in-turn, leads to large scale organised spoiling of the resources. It is a common practice, especially in Asia, Africa and Latin America, to find politicians and environmental violators working in tandem—both covertly and overtly—to maximise the short-term return of unsustainable exploitation of natural resources following the 'political rent seeking' model as they say in economics (Basu, 2021). Water is no exception.

TRANSBOUNDARY RIVER PARADIGM IN SOUTH ASIA

If one considers South Asia, it is found that most countries in the region and around, like China, India, Pakistan, Bangladesh and Nepal, are at rift over the rivers like Ganga, Brahmaputra, Sindhu or Indus, Teesta and likewise. India and Bangladesh, otherwise geopolitically close, have decade-old disputes over water sharing of Ganga (Fig. 1) and Teesta (Fig. 2), as both countries want to get significant share of dwindling water resources being hampered by climatic change, human intervention and a range of issues. Similarly, river rift adds to already stretched bilateral political relationship of India and Pakistan while Nepal and India also has long term transboundary river issues.

South Asian trans-boundary river issues are linked strongly to regional geopolitics due to three main factors:

Figure 1. Ganga-Brambhaputra-Meghna basin (Source: Dholakia, 2019)

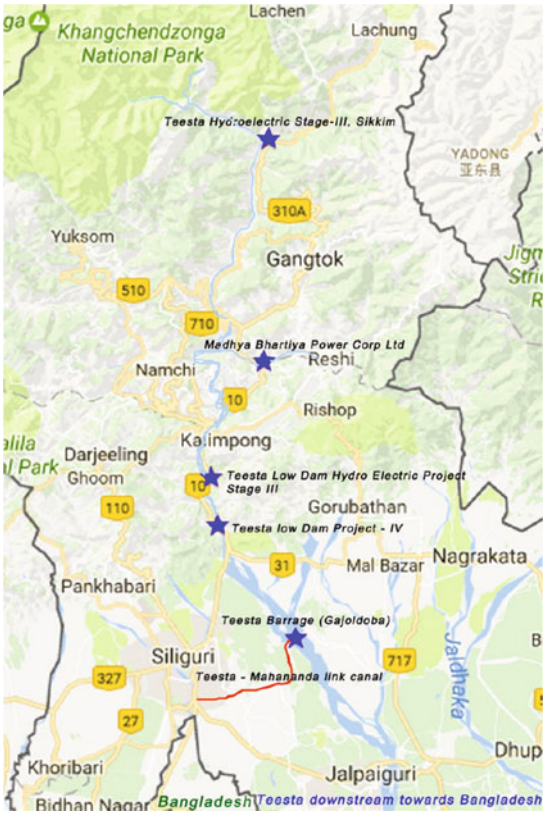

Figure 2. The Teesta channel and some of the studied landmarks along the river(Source: The Third Pole).

1. The main river systems are generally circum (Himalayan).
2. All countries in the region strongly depend on rivers for agriculture, hydroelectricity and also for a range of reasons.
3. Unequal political power positioning in the region.

India, Pakistan, Bangladesh, Bhutan, Nepal and Afghanistan share twenty major rivers. The Indus basin (consisting of the Indus, Ravi, Beas, Sutlej, Jhelum and Chenab rivers) inter-links India, Pakistan and China, while the Brahmaputra and the Ganges basins inter-link China with India (Fig. 1), Nepal, Bangladesh and Bhutan. The Kosi, Gandaki, and Mahakali rivers join Nepal with India. Major rivers shared between India and Bangladesh include Brahmaputra, Ganges and Teesta. Pakistan and Afghanistan share the Kabul river basin (Dholakia, 2019).

It is seen that the main river systems (Indus, Ganges and Brambhaputra) are connected to Tibet, making China a major player in the process, while there are reasonable basin overlap among the upper riparian and lower riparian countries in the region that enhances the geopolitical angle. The fact that both China and India, the largest countries in the region, has hydropower and river linking aspiration; does not help the situation.

The situation often gets more complicated and terser as the upper and lower riparian water relationship also gets influenced by regional and local political relationships. State of West Bengal has become an important player in the Ganga and Teesta river water sharing between India and Bangladesh, and state political leaderships over the years have played, and are playing, key roles in forging, or not forging, the India – Bangladesh national level agreements on river water sharing (Basu, 2017a).

It is also to be considered that sparring countries often have different, and even contradictory sectoral interests regarding the use of river water, that further magnifies the fissure within countries sharing a common river source. For example, while China tries to milk the hydroelectric potential of river Brahmaputra, India and Bangladesh predominantly use the river water for agriculture (Ghosh, 2020).

INDIA BANGLADESH RIVER DYNAMICS

Within South Asia, India-Bangladesh transboundary river dynamics, and the related political play, needs special mention due to sheer enormity of the split resources. Incidentally, India (almost entirely the state of West Bengal) and Bangladesh shares 54 trans-boundary rivers (Nishat et al., 2014).

The political tension has operated back and forth for about last four decades over the appropriate allocation, access and development of river water; initially with river Ganges and subsequently with river Teesta (Fig. 2). After a longstanding dispute, two countries could ink comprehensive bilateral treaty in 1996 for sharing Ganges water for next 30 years; i.e. 2025 (Haq, 2012). Despite the agreement in place, many

in Bangladesh claim that the country has not been getting its fair share of water and criticizes the role of Farakka barrage in the context (Sayanangshu, 2020).

Subsequently, following the Ganges water sharing model, Bangladesh demanded an agreement on Teesta water sharing, claiming that a significant part of the country has been suffering as inadequate non monsoon water flows from Indian state of West Bengal to Bangladesh vis-à-vis undertaking cultivation within the command area of Teesta belonging to Bangladesh part. Despite many rounds of talks and even draft agreements on sharing being arrived at, the official agreement could not be reached yet as Indian state of West Bengal had disagreement on some of the clauses. The endorsement of West Bengal is critical to ink the agreement as water, including river, is on concurrent list of Indian constitution and, hence, union government in India cannot formalize the agreement without the official consent of West Bengal government. The issue has become a major political thorn for Indo-Bangladesh relationship and even several rounds of meetings in the highest administrative levels of the two countries could not resolve the disagreement. (**Majumdar**, 2017).

Since 2015, political posturing and counter posturing has also initiated with river Atreyi, which happens to be coming to India from Bangladesh, with river dependent community in West Dinajpur district in West Bengal complaining that disproportionate volume of non-monsoon flow of the river is being shared to the neighbouring country, leading to significant discontent in Indian side. There have been correspondences between West Bengal government, Union Government of India and Bangladesh government on the agenda; with Inland Waterways Authority of India writing to Inland Water Transport Directorate, West Bengal in March 2020, exploring the possibility of Atrai river dredging within West Bengal as per the request of Bangladesh government (IWAI, 2020).

While the political back and forth continues with select rivers in two countries, the actual scale of the agenda is much bigger and, actually, offers the scope of mutual benefit. A 2014 report of major global environmental organization IUCN (Rivers Beyond Borders: India Bangladesh Trans-boundary River Atlas) shows that transboundary rivers in these two countries cover 15322 km; roughly split 60:40 vis-à-vis India and Bangladesh. The report also shows that out of 54 rivers; though 45 have originated in India, 6 actually originated in Bangladesh including important rivers like Punarbhaba, Kulik and Atreyi while another three are born in Tibet and Bhutan (Nishat, et al., 2014). Kalyan Rudra, a river scientist from West Bengal, found in his study that the state receives usually 481949.6 million cubic meter of water in monsoon and 116613.2 million cubic meter of water in non-monsoon months, almost one-fourth compared to monsoon; which vindicates the importance of transboundary rivers in the state of West Bengal (Rudra, 2018).

All these data underline the fact that only upper riparian versus lower riparian country narrative does not hold water in such a dynamic water sharing paradigm as both countries are dependent on one another, albeit in varying scale, for water flowing from one to another; which opens up the argument for holistic intercountry and stakeholder level discussion to arrive at a comprehensive trans-boundary river water usage model. The discussion also needs to consider the current and projected

water flowing paradigm in these rivers under stress of climate change and also a range of local or regional factors; to arrive at a pragmatic solution mode.

It is often found that countries, and their political leaderships, fail to delve deep in the huge mutual trans-boundary river resources; and instead concentrate on few rivers like Ganges or Teesta to score political brownie points without properly assessing the ground reality of these rivers.

TEESTA WATER SHARING POLITICS: REALITY VERSUS RHETORIC (CASE STUDY)

Teesta river seems to be a good case study to trace this bigger than upper riparian versus lower riparian straight forward narrative. Over 20 million people are stated to depend on river Teesta. While Bangladesh is keen to have an agreement on Teesta's water sharing for supporting its agriculture, irrigation and livelihoods; and, union government of India is open to such proposal considering the wider geo political implication; Indian state of West Bengal consistently countered such water sharing proposal claiming it would jeopardize the interest of people in northern part of West Bengal. The issue is still hanging with potential of triggering far-reaching political consequences in the region.

Assigned by the global media platform The Third Pole, in 2017 the author of the current paper, an environmentalist and an environment journalist, had undertaken an on-ground investigation from Sikkim (where the river originated) till the entry point of Bangladesh where its journey finally winded in Brambhaputra; and the findings are not only revealing but also contest the popularly believed narrative about the water sharing, or rather the failure of it, between India (West Bengal) and Bangladesh particularly in case of Teesta.

The findings and observations are as follows:

Hardly any water available to split between India and Bangladesh

An internal report prepared by West Bengal government on Teesta river at the peak of its water sharing controversy, accessed by the author, points out as mentioned in The Third Pole that "Two barrages on Teesta, at about 100 km from each other, in India and Bangladesh were planned to cater [to] irrigation in more than 16 lakh [1.6 million] hectares of land together; around 9.2 lakh [920,000] hectares in [the] state of West Bengal in India and 7.5 lakh [750,000] hectares in Bangladesh. According to a rough calculation, such a scale of irrigation for boro crop (dry season paddy) will require around 1600 cumec (cubic metre per second) of water; while through much of the dry period the river hardly has 100 cumec of water, i.e., one-sixteenth of total

water requirement in [the] two countries." Interviews with concerned officials confirmed that in recent times, river's peak summer (April and May) water volume has plummeted below 100 cumec (Basu, 2017a).

A committee set up by West Bengal government in 2016-17, under the then principal secretary of the public works department (PWD), suggested that the state should only irrigate 52,000 hectares land with Teesta's water; acknowledging the reduced water volume in Teesta. The referred landmass is only 10% compared to the originally devised plan for irrigation. Sources in West Bengal government claimed that the committee report and suggestion vindicate state's continuing reluctance in parting of Teesta water toBangladesh through a legally binding water sharing agreement; despite continuing pressures from respective union governments of Bangladesh and India.

It may be pointed out in the context that ruling and opposition political parties in West Bengal, are both on the same page over the decision of not parting Teesta water to Bangladesh acknowledging in private the state view that such step would compromise the need of a significant population segment residing in northern part of the state including Siliguri; one of the most important and strategically placed city in state after Kolkata.

Poor Planning: Priorities Changed

India has a barrage on the river at Gojoldoba at Jalpaiguri district of West Bengal, a little upstream of the point where the river enters Bangladesh. The Bangladesh government built a barrage at Doani in Lalmonirhat district, before Teesta rushes to join Brahmaputra.

The report underlined that "while the barrages were planned primarily to provide supplementary irrigation support to aman paddy cultivation during monsoon, subsequently both barrages were used to support boro cultivation during dry season, when there is minimum water in [the] river"; highlighting the role of changed mode of agriculture, and hence changed and increased demand of irrigational water.

The fact that the barrages are not designed for any water reservoir facility, also does not help and, rather, compels major part of the monsoon water to be forced out rather than being held back for dry months.

This changed paradigm of agricultural pattern has also been vindicated in a study carried out in Bangladesh by two agencies - International Food Policy Research Institute (IFPRI) and the Centre for Agri-research and Sustainable Environment & Entrepreneurship Development (CASEED). The study also showed that dry time Boro agriculture has been gradually replacing the monsoon fed Aman agriculture. Even few years back, Aman crop dominated being cultivated on 80% of the land in the area but in recent years the table has turned with Boro crop, highly water intensive, has become the trend. (Basu, 2017a)

Hydroelectricity Factor

Series of large number of hydroelectric projects along Teesta have already been commissioned or in different stages of being commissioned in Indian states of Sikkim and also in West Bengal. Sikkim is upstream to West Bengal. These hydroelectricity projects are stated to be built on run-of-the-river mode, meaning they are not supposed to retain water for a considerable period.

However, the fact on-ground is different. One finds that the riverbed immediately downstream to Teesta Low Dam Project (Phase IV) has become fully dry; in sharp contrast to its immediate upstream where large volume of stagnant water is retained.

The scenario not only gets repeated at Teesta Low Dam Project (Phase III), a 132 MW run-of-the-river hydropower project, but also in case of various projects further upstream in Sikkim. Clearly the volume of the stagnant water being retained gets bigger with the bigger projects; indicating a clear cause-effect relationship between the two.

Discussion with the wide range of stakeholders found that the reason behind the trend is linked to status of India's national electricity grid. The online national power exchange shows that supply remains greater than demand for about four-fifth period of an average day, the dynamics only get reversed during the peak demand period of evening time; around 6 to about 10 pm. This trend pushes most power generation companies to sell their electricity during evening period as they normally get peak rates at that time. The trend, in turn, triggers hydropower projects to predominantly restrict their power generation to evening period; retain water for rest part of the day (20-21 hours) and only release it during the evening hours when the water is required to turn their turbines.

The whole phenomenon, working in series as there are several hydropower projects in the river, triggers a cascading effect throughout the entire river. With power projects and dams holding the water back, hydropower projects in downstream do not get adequate water during the day; only getting it during those 3-4 hours when the water gets released by upstream projects. Naturally the downstream projects often store that to run turbine, and generate power, during peak generation period to come next. The trend impacts the downstream in a critical manner (Basu, 2017b).

This trend often leads to another mismatch between the time when the farmers need the water (during the day) and when it actually gets flown through the river; during very late evening, night and early morning. This lack of coordination not only hits the peasants hard but also often leads to longitudinal cut-off in the river flow over large stretches affecting the river ecosystem in extremely critical manner. This author could confirm the trend through his interview with a senior official of Teesta Low Dam Project (Phase III), who had chosen to remain anonymous; "During impounding, generally 1-2% of the water is released downstream to maintain the river ecosystem". In 2017, the National Green Tribunal (NGT) directed that all the rivers in the country shall maintain a minimum 15 to 20 percent of the average lean season flow of that river, also called the environmental or e-flow (Joshi, 2019).

Officials of privately owned hydropower units like Madhya Bharati Power Corporation (MBPC), which has a power generating capacity of 96 MW, agreed that the practice is in vogue. “During the lean season, all, particularly the larger plants, have to impound the water for power generation”. The MBPC expert alleged, “Sikkim government is just interested to receive about 15-20% proceeds from the plants and hardly monitors [them]. People from the central ministry occasionally come but that is mostly routine in nature.”

In Sikkim only (as on 2017) 29 hydropower projects were planned having capacity from 30 to 1,200 MW each, totalling close to 4,400 MW. “Undertaking so many hydropower projects in Sikkim without any proper comprehensive scientific study is going to impact Teesta’s ecology and ecosystem,” Sonam Wangdi, former Chief Secretary of Sikkim, complained to the author.

The impact of hydropower projects on river flow can be understood from the situation in Rangit river. Based on the water flow measuring point data adjacent to Teesta Bazar, Rangit (one of the major tributaries of the Teesta) has hardly lost any flow during last few years, in telling contrast to the main flow of Teesta. This is not coincidental that while Rangit has one hydropower project upstream; Teesta has many.

The developments trigger the debate that whether such hydropower projects should qualify as run-of-the-river projects, though they were given approvals based on that premise despite the opposition from green lobby.

“The NHPC (National Hydro Power Corporation) has declared that Stage III and IV are ‘low and run of the river dams’. However as both are more than 15 m in height, they cannot be categorised as ‘low’ since the International Commission on Large Dams criteria for a large dam is anything above 15 m in height,” river expert Kalyan Rudra pointed out. Rudra also told this writer in an interview that the entire flow of the Teesta had “lost synchronization due to the various ‘stop and store’ steps applied” (Basu, 2017b).

“These are anything but run of the river projects as they are holding water for considerable periods, often in excess of 10 h at a stretch,” pointed out ecological economist Nilanjan Ghosh, Director of Observer Research Foundation, Kolkata Region. “There seems to be little coordination among the plants and as a result there is hardly any coordinated release, and hence flow,” reiterated the expert (Basu, 2017b).

There are other issues as well linked to long-term holding of the water. “The evaporation and seepage losses of water in other major irrigation projects in West Bengal is very high. There is no reason to believe that the experience of the Teesta Barrage Project (TBP) would be otherwise,” said Rudra. “We have found that in the Ganga, the evaporation may lead to about 15% water loss. It is highly likely with the water being impounded in stagnant pools, the actual evaporation in the Teesta is higher,” added Nilanjan Ghosh who observed that lack of any effective sediment control system further complicates the problem.

Measuring Water Flow During Wrong Time

The timing of measuring water flow in Teesta assumes importance in context to the water retention—release phenomenon being practiced in Teesta hydropower projects.

In the Indian state of West Bengal, Teesta water flow gets measured at three points; most elaborately at Domohani by Central Water Commission (CWC). Interestingly while here, the water flow gets measured in morning hours after 9 am; maximum release of water happens, as explained earlier, either close to midnight after the evening peak generation or early morning after the mini peak. "It's a fact that when CWC measures water at Domohani, the peak flow can be absent as hydropower plants generally release water at night," river expert Kalyan Rudra communicated during the interview.

Apparently, Bangladesh also measures water level of Teesta in their area when the peak flow gets already perished.

The Teesta-Mahananda Link Canal Impact

According to figures, the Teesta water flow started receding significantly since late 1970s. The mean average discharge of water got reduced from 541 cubic metres per second (cumec) during 1979 to 200 cumec in 1999; by a whopping 63%. The minimum discharge (during summer months) got reduced by even 90% occasionally. Figures point out that the reduction in flow initiated in 1979-80, when the minimum discharge became 195 cumec from 361 cumec in previous year (Basu, 2017c).

Downstream to Gajaldoba barrage, the flow got even thinner after the barrage started its full operation in mid-1990s. The Teesta-Mahananda link canal at the barrage, that takes the waters of the Teesta to the Mahananda, contributes. "Around mid-nineties the minimum flow from upstream during the lean months was often 100 to 110 cumec; we normally used to keep 80% and released 20% downstream," said P.K. Basu, a retired irrigation engineer in West Bengal government, to this author in 2017, during an interview (Basu, 2017c).

Scientific researches corroborate the trend, "With reference to the last 15 years, there is declining trend of annual discharge and severe water scarcity can be perceived during non-monsoon (months) due to high demand and declining supply," said geographer Kausik Ghosh in his study.

As per 2010 data, every year West Bengal has been pushing around 10% of Teesta water through the Teesta-Mahananda link canal; which, according to P.K. Basu, could have been more if the irrigation network could be completed in West Bengal. "Though the main canals were completed, but due to the land acquisition policy of the present Trinamul Congress government in West Bengal, hardly any new irrigation network could be created. As a result, though the

Teesta-Mahananda link canal has the capacity to carry around 330 cumec, hardly 190 cumec is taken when there is sufficient water. In the lean season, it must be far less," explained the expert. The laid down policy of the government was not to acquire any land forcefully from people.

"During the driest months of the lean season, West Bengal has to hold back most of the water and channel it through the link canal otherwise not only will agriculture over a vast area be affected, but even Siliguri may be affected as much of its drinking water comes from this canal," reminded Nilanjan Ghosh. Incidentally Siliguri happens not only to be the second largest city in West Bengal but assumes importance due to its strategic positioning being close to various international borders.

This author saw that only 2 out of the 45 gates in Gajaldoba barrage remained open in early June.

Geographer Kaushik Ghosh's study (*Planform Pattern of lower Teesta River after the Gajaldoba Barrage,* published in the Indian Journal of Geography and Environment in 2014) reiterates that mean annual discharge received at the barrage has gone down nearly one-third, from 725 cumec in 1993 to 480 cumec in 2010 leading to the braiding, generation of multiple channels in intertwined manner, in recent years; tell-tale evidences that reducing volume of upstream water further enhancing the sedimentation rate, hence, braiding of the river (Basu, 2017c).

Baishali Mukherjee and Ujwal Deep Saha from geography department of Calcutta University mentioned in their paper (Teesta Barrage Project: A Brief Review of Unattained Goals and Associated Changes, published in the International Journal of Science and Research in 2016) that "water demand in Teesta basin has increased but the available water decreased by 32% from 1990 to 2010, from 69 billion cubic metres to 47 billion cubic metres" (Basu, 2017c).

The combination of reducing water flow along with enhanced water demand has made the situation critical in West Bengal as the river happens to be the major source of water in northern part of the state. "Teesta water, through the Teesta-Mahananda link canal, caters to the paddy and other cultivation, tea gardens and as well as to Siliguri for drinking water," pointed out environmentalist Animesh Bose from Siliguri to this author in an unpublished interview. (Basu, 2017c)

"There has been increasing pressure as the command area for irrigation is consistently increasing but we have inadequate water in link canal," admitted a senior official in the state government during unofficial discussion.

The Climate Change Effect

A 2007-08 study report of the Ministry of Environment, Forests and Climate Change, pointed out that out of the 34 major glaciers contributing water flow in the Teesta, 23 were showing retreat while 8 could be found advancing and rest three glaciers remained unaltered. "While in 1990, 34 glaciers used to cover an area of 305 sq. km, in 2004 the glacial cover on the Teesta basin was reduced by four sq. km," the report added (Basu, 2017c).

According to climatologists, this reduction at source has been contributing over the years to reduce the water volume in Teesta from Sikkim to West Bengal and beyond. The trend is likely to continue in coming years.

NATURE BASED NEGOTIATED APPROACH (NBNA)IS THE KEY

The Teesta study, as elaborated, clearly vindicates the importance of having consolidated dialogue involving all the stakeholders and their linked interests, based on credible nature-based evidences on the agenda; which unfortunately has not been done yet on Teesta, a process may be called Nature Based Negotiated Approach (NBNA).

Overall, if we look at the trans-boundary rivers and rifts within countries based on them, we will find the root cause is over the splitting or sharing of resources, particularly with the resource volume often diminishing for a range of reasons. Such conflicts also percolate down to intra country level. Often political macro level positioning vis-à-vis the conflicts, and the dialogues catapulted by those, tend to ignore on ground nature-based issues involving multiple stakeholders; and thus, fail to lead towards a sustainable discourse.

For a sustainable discourse, the involvement of all major stakeholders (which can be different from case study to case study) like agricultural workers, industries, domestic users, fishermen, transport operators as applicable need to be addressed. Emphasizing on one's stake, however major it seems to be, may lead to inherent long term unsustainability of the discourse.

Analyses show that there are three dimensions of river related conflicts. The first is emergence of direct competition for water as an increasingly scarce resource. Second conflict relates to large scale infrastructure projects, particularly those lead to people displacement and other social and environmental impacts in and around the rivers. The third dimension of water-related conflicts involves disputes over the appropriate levels, roles and access of various stakeholders in river basin management. While the first two, mainly macro-level agendas, get often focused; the third gets overshadowed in multinational process (Hirsch et al., 2005).

All water management techniques have complex and multi-dimensional implications, related to the existing geographical, ecological, socio-political and economic situations. However, these techniques require to be modified, updated and adapted in response to changes in the existing order, or if the primary objectives of adequate and equitable supply and sustainable use of water resources are not achieved. The Nature Based Negotiated Approach (NBNA) to Integrated River Basin Management seems to be the key in addressing transboundary conflicts including those in South Asia.

Integrated River Basin Management (IRBM) is essentially a work concept that aims to conserve and utilize the natural resources within a river basin sustainably,

through integrating the needs and skills of various stakeholders like government departments, academics, farmers, and the private sector.

The Negotiated Approach to IRBM is a variant of conventional IRBM, and based on the collective vision that: 'Sustainable and equitable water resources will be enhanced through a negotiated approach that recognizes the river as a unit and embraces local level initiatives, while simultaneously adopting an integrated and ecosystem approach to basin management'. The addition 'negotiated' explicitly indicates that this approach is aimed at creating space for negotiation, including with local stakeholders, on river basin management options.

Negotiation needs to be pursued at and between the local, regional, national, and international governance levels. The 'negotiated approach' should include and responds to local initiatives, and starts from the basis that management policies should build on existing local practices of integrated land and water use. It recognizes the potential of local resources and knowledge to meet the challenges of integrated water management.

It is felt that the proposed NBNA model will be a mix of top-down and bottom-up approaches which should allow local actors to develop river resource usage and broadly basin management strategies specific to their local context, which may then be incorporated and integrated in the larger basin management plan. This allows their knowledge to influence regional and national decisions, ultimately resulting in a truly bottom-up process of policy development and management.

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