Contributing Factors in the Ongoing Water Conflict Between Bangladesh and India

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March 2009

Abstract:

The existing 1996 Ganges water sharing treaty between India and Bangladesh has proven itself to be inadequate in handling record low flow situations. This case study depicts the water demands and uses, disagreements, and conflicts over the Ganges dry season flow and the effectiveness of the current water sharing mechanisms. The Ganges is a major source of water for Eastern India, supplying major urban centers, irrigating the fertile Gangetic Plain, and keeping the Port of Kolkata navigable throughout the year. The remainder of the share is used by downstream Bangladesh for irrigation, navigation, and maintaining the ecological balance of the Ganges estuaries. Here we identify national economic priorities, an asymmetry of power, and extreme physical conditions at play for the continuation of the conflict over dry season streamflow. The Ganges is an integral part of the society, as well as economy, religion, and the environment of the eastern part of the Indian Subcontinent. Economic priorities such as food grain production, and maintaining the navigability of Kolkata Port, led to the construction of a barrage at Farakka, near the border with Bangladesh. For the downstream riparian country, freshwater availability depends on the share of water diverted by upstream India, and as a result Bangladesh has experienced a 50% decrease of dry season mean flow amounts since the commissioning of the barrage in 1975. Such drastic reductions have caused a series of problems including drop in agro and fish productivity, saltwater intrusion and ecological imbalance in estuarine areas, and reduced navigation.

Issues Addressed and Lessons Learned

In this case study, we address the (a) role of an asymmetry of power vis-à-vis economic incentives as factors in successful negotiation over water conflicts, and the (b) impact of water scarcity on the natural environment. An asymmetry of economic, political, and military power, and lack of economic incentives have allowed India to not address this conflict in a serious manner. As a result, the lack of progress in this issue compounded by a frequent recurrence of drought years have caused environmental and socio-economic problems, as well as a growing sense of helplessness and anger, and hardened public opinion in Bangladesh. This case study identifies the main interactions and feedbacks at play between economic choices, asymmetric power, and frequent droughts at the root of this conflict. This also shows how the extreme seasonality of physical conditions can cause failure of existing governance structures, especially over transboundary domains.

1. Issues, Context, and relevant NSS Variables Summary

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Variables Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Season Water Supply</td>
<td>India and Bangladesh, Quantity (Q), Governance (G)</td>
</tr>
<tr>
<td>Irrigation</td>
<td>India and Bangladesh, Quantity (Q), Economy (C)</td>
</tr>
<tr>
<td>River Navigability</td>
<td>India and Bangladesh, Quantity (Q), Economy (C), Governance (G)</td>
</tr>
<tr>
<td>Estuarine Ecosystem</td>
<td>India and Bangladesh, Quantity (Q), Quality (P), Ecological Services (E), Governance (G), Economy (C)</td>
</tr>
</tbody>
</table>

The Ganges River and its distributaries have given rise to one of the most densely populated and culturally vibrant regions on earth. Due to the pressures of population growth and economic development, India constructed and began to operate the Farakka barrage in northeast India in the mid 1970s. The barrage has indeed spurred the economic growth of West Bengal state of India, but as a result of the water diversion project, downstream users of the Ganges in Bangladesh are suffering from water shortages that may only worsen in spite of the water-sharing treaty that has been in place since 1996. The shortcomings of the 1996 treaty are not likely to be overcome unless the underlying economic and political causes of the dispute are addressed. Due to India’s relative political, military, and economic/trade advantages as well as its status as the upper riparian state in the dispute, it may be up to Bangladesh to create economic, political, and/or strategic incentives that may motivate India to consider long-term scientific solutions that will help to ensure that the needs of all South Asia’s people are met.

2. Description of the Setting

The Ganges-Brahmaputra-Meghna (GBM) river system is one of the largest freshwater flow regimes in the world. Two large east Himalayan rivers, the Ganges and the Brahmaputra, are joined by the Meghna, which originates in one of the most rain-prone areas of the world, and drain through Bangladesh to the ocean. In the process, these rivers have built up the Bengal Delta, the largest and most populated delta on earth. The Brahmaputra originates on the Tibetan plateau, traverses about 1800 km through the Himalayas and enters Bangladesh through the northeastern part of India. The Ganges originates in India in the foothills of the Himalayas and flows for about 1500 km before it enters Bangladesh through the western side (Chowdhury & Ward, 2006). The two rivers merge inside Bangladesh and flow about 150 km as the Padma (the local name inside Bangladesh) before joining with the Meghna and flowing into the Bay of Bengal (Figure 1). Five countries, India, Bangladesh, Bhutan, Nepal, and China are considered riparian neighbors of this huge basin.
The Ganges River Basin spans from its headwaters in north-central India and the Himalayan Mountains of southwestern Nepal to the Bay of Bengal coast in Bangladesh. After coming down from the Himalayas, the river meanders through the northern plains of India, from Uttar Pradesh to the West Bengal province. On its path lie the historic Mughal cities of Lucknow and Allahabad, and the Hindu holy cities of Bodhgaya and Varanasi. The Ganges River, being the lifeline of the local and regional environment, has been an integral part of the historical, cultural, social, and religious belief system for the inhabitants of this region. Being a major transboundary river, it has established its presence in the regional political and diplomatic domains as well.

Physical and Social Attributes

<table>
<thead>
<tr>
<th>Location</th>
<th>South Asia, central to eastern Subcontinent: lies within latitudes 23° N and 30° N and longitudes 73° E and 90° E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Population</td>
<td>1,147,995,904153 million</td>
</tr>
<tr>
<td>Watershed Area</td>
<td>950,000 sq km</td>
</tr>
<tr>
<td>Average Annual Rainfall</td>
<td>1400 mm</td>
</tr>
<tr>
<td>Average Annual Temperature</td>
<td>-4 C to +41 C</td>
</tr>
<tr>
<td>Top Uses of Water</td>
<td>Irrigation, River Navigation, Domestic Supply, Estuarine Navigation (Flushing of silt at Kolkata port)</td>
</tr>
</tbody>
</table>

3. Problem Definition

As the majority of the drainage basin area is not situated in Bangladesh, the contribution of local rainfall to these flows is less dominant, especially in the Ganges and Brahmaputra basins. However, prolonged local rainfall in the months of July and August, when the major rivers are also at peak, aggravate the flooding situation (Chowdhury & Ward, 2004).

On the other hand, the region has a contrastingly dry low flow season compared to the typically wet rainy reason. As we can observe in the hydrographs (Figure 3), the flow cycles are highly seasonal. The lowest flows in the Brahmaputra and the Ganges rivers are recorded during December-March and are typically one-tenth and one-twentieth of the average flood flows in respective rivers (WARPO - Water Resources Planning Organization of Bangladesh, 2000a). Thus, drought is another commonly occurring natural phenomenon in Bangladesh and is not confined to the dry season. Most of the annual precipitation in this basin occurs during the four months of the monsoon period (Mirza et al. 2001). As most agricultural lands of the country are dependent on seasonal rainfall for plantation of rice, rainfall variability, such as a late or inadequate monsoon, water deficits during certain periods of the year can induce severe stress on crops and reduce yield in this predominantly agricultural country.

Sharing these transboundary rivers has been a major socio-political issue since the birth of India and Bangladesh (formerly East Pakistan). This region is the home of hundreds of millions of people, who live along the banks of these great rivers and their flows are an integral part of the peoples’ social, economic, and cultural lives. Thus, the amount of streamflow in these rivers or the lack of it profoundly affects their lives in general. The primary source of conflict over the Ganges has been the commissioning of the Farakka barrage in the year 1975, which was originally constructed to divert water from the main river in the dry season to flush the sediments gathering in the river Hooghly, a distributary of the system that provides navigation for the port of Kolkata (Figure 4). Since the barrage started its operations, low flow water availability has dropped considerably (Tanzeema & Faisal 2001) which has led to serious drought problems and saltwater intrusion problems in southwestern Bangladesh (Rahman et al 2000).

According to Tanzeema and Faisal (2001), an integrated basin-wide management of these rivers, especially the Ganges, would have been an ideal and technically correct solution to the many water related problems faced by the people of Bangladesh and India. Unfortunately the existing social, economic, and political realities of the region have only allowed a limited solution for the water sharing problems. India has signed several bilateral treaties with its neighbors, such as Pakistan, Nepal and Bangladesh; nevertheless, there has not been any approach looking at the problems from a basin scale, nor has there been any initiative to exchange water resources data extensively between these countries for water planning and management objectives.

With regards to the Farakka Barrage, Bangladesh has signed two water-sharing agreements so far, most recently in 1996 (table 3), to manage the water efficiently between the two countries during the dry season. However, this agreement has already proved inadequate for extreme drought situations and has limited provisions for improvement. The socio-economic and environmental impacts of extreme drought years and lack of agreement between the two riparian countries to modify the agreement may lead to future conflicts.

4. Variable Identification
A review of current literature on the Ganges reveals that the issue of major concern is the quantity of water available to the mega-city of Kolkata and to southwestern Bangladesh, both of which rely on the Ganges water for short- and long-term needs. However, there is evidence that the underlying causes of water quantity problems are of political and economic nature, both in the conditions that had lead to the construction and implementation of the Farakka Barrage itself, as well as those precluding a fair and workable long-term water sharing agreement. Politically and militarily, India is by far the stronger of the two nations, and wishes to not only maintain its dominance but also enhance it; these factors are reinforced by India's advantageous terms of trade, economic growth, and position as the upper riparian state. Any future effort to resolve the ongoing dispute between India and Bangladesh must address these underlying variables to be successful in the long run. The remaining part of this section will describe the three main underlying variables: Quantity, Economics, and Institutions (political, military, and technical).

(A) Quantity: Water Scarcity Issues and Existing Agreements

The impact of the Farakka Barrage on dry season flow in the Ganges and the subsequent impact on the ecology of southwestern Bangladesh

The diversion of dry season flow at the Farakka barrage in India has shown a long-term impact on the flow characteristics of the Ganges. Since the Farakka Barrage was implemented in 1975, the mean dry season flow has never exceeded the long-term average (Figure 5). While the annual flow patterns have been minimally affected, the dry season flow has declined to less than 50 percent of the long-term average (Figure 6). Table 4 shows the impact of the Farakka barrage in comparison with the previous decades of available data, where the April and May mean flow values have dropped to less than 1000 m³/s for the 1990s. An additional important observation in Table 4 is that fourteen (14) of the lowest monthly flow values (all below 1000 m³/s) have occurred within the past twenty (20) years.

The present water-sharing agreement between India and Bangladesh has proven itself inadequate due to the limited provision of sharing dry season flows and also because it contains no contingencies for modification should problems arise. In addition, the entity responsible for overseeing transboundary water issues, the India/Bangladesh Joint Rivers Commission (JRC), cannot bilaterally discuss and reach fruitful settlements without involving respective higher governmental authorities (Tanzoema & Faisal 2001). Indeed, the JRC has "no teeth," is prone to beuarocraic bottlenecks, and its members are highly influenced by political pressures from their respective countries. Some recent droughts and unexpectedly low flow amounts in the Ganges during recent dry seasons (1993-96) have led to serious water scarcities on both sides of the border. There is wide agreement in both Bangladesh and India that the agreement needs to be revised to address scarcity issues in severe flow months or seasons.

Impacts on Quality and Ecosystem Services

The reduction of dry season flow in the Ganges has led to various water quality and ecological problems in southwestern Bangladesh. The main impact of reduced low flow values has been the drop in hydraulic head of the Ganges river system, and the consequent increase in salinity in southwestern Bangladesh Rivers (Rahman et al. 2001). The increased salinity has led water quality problems in groundwater aquifers, and drop in agricultural production and freshwater fish yield. The increase of salinity in the Ganges distributaries has also led to ecological impacts on the world's largest mangrove forest, the Sundarbans, a UNESCO World Heritage Site. A salinity level of 10 ppt (parts per thousand) in the water inundating the shores of the canals and the rivers of the Sundarbans area have led to the "top dying," a disease of the prevalent native Sundari trees. Symptoms of this disease include burning and firing of leaf tips of margins, bronzing, premature yellowing, abscission of leaves, and eventual dying of the trees (Hoque et al. 2006).

(B) Economics: Past and Present Issues, and Future Possibilities

Economic issues between India and Bangladesh: Bangladesh's Comparative "Disadvantage"

India is the largest country in the South Asian region in terms land mass, population, and GDP, and the India/Bangladesh relationship is largely a function of the disproportionate economic power that India enjoys. India's GDP is more than ten times that of Bangladesh; its per capita GDP is more than twice that of Bangladesh. At nine percent per year, India's economy is also growing 50 percent faster than Bangladesh's (CIA, 2008), meaning that, rather than shrinking in magnitude, the issue of disparity is likely to grow. India also has a distinct trade advantage over Bangladesh, with exports from India constituting 15 percent of Bangladesh's total imports but just three percent of India's exports. India is now Bangladesh's single largest source of imports; at the same time, Indian imports from Bangladesh make up a negligible proportion (about .01%) of India's total imports. Through the South Asian Free Trade Agreement (SAFTA), India currently grants tariff concessions for selective items to Bangladesh (World Bank, 2006).

India's Desire for Regional Economic Dominance and its Impact on the Farakka Dispute

One potential solution to the Ganges dispute is construction of reservoirs in the Nepalese headwaters of the Ganges, which would help to ensure sufficient Ganges water outflow during times of drought. Dams could also be constructed to generate hydroelectric power that India could purchase from Nepal, to address the ballooning energy deficit that is expected to reach 20,000 MW by 2010 (AsiaTradeHub.com). Nepal is endowed with enormous hydropower resources: roughly 42,000 MW of economically feasible hydropower potential, less than 1 percent of which has been developed. However, talks with Nepal have consistently faltered, and India has made it clear that it is not interested in this path. Should India collaborate with Nepal, "Nepal would have been in an ideal position to turn the tables on the Indian government. Nepal could then, if it had chosen, have exploited its advantageous location and exerted pressure on the India government over not only the Farakka issue, but perhaps also to more general political and economic advantage" (Jacques, 2000).

However, Bangladesh does appear to have some leverage power over a proposed natural gas pipeline. The countries' neighbor to the East, Myanmar, is rich in natural gas that India would like to import; but, to do so, it would have to run a pipeline through Bangladesh. Although in 2005 Bangladesh agreed on the principle of the plan, no agreement was signed (Sengupta, 2005). Yet India's energy deficit, however, grows by the day.
The mighty Ganges River and its distributaries have given rise to one of the most densely populated and culturally vibrant regions on earth. Due to the pressures of population growth and economic development, India constructed and began to operate the Farakka Barrage in northeast India. The barrage has indeed spurred the economic growth of West Bengal state of India, but as a result of the water diversion project, downstream users of the Ganges in Bangladesh are suffering from water shortages that are predicted to only worsen in spite of the water-sharing treaty that has been in place since 1996. The shortcomings of the 1996 treaty are not likely to be overcome unless the underlying economic and political causes of the dispute are addressed. Due to India’s relative political, military, and economic/trade advantages and its status as the upper riparian state in the dispute, it may be up to Bangladesh to create economic, political, and/or military incentives that may motivate India to consider long-term scientific solutions that will help to ensure that the needs of all South Asia’s people are met.

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References

