Competition for water resource in the Brahmaputra river basin- issues of concern

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ABSTRACT

The River Brahmaputra, which is essentially a transboundary river; originates in the Angsi glacier, located on the northern side of the Himalayas in Burang County of Tibet and is known as Yarlung Tsangpo. It flows for about 2,900 km across southern Tibet to break through the great Himalayas in great gorges (including the Yarlung Tsangpo Grand Canyon) and into Arunachal Pradesh, where it is known as Dihang or Siang. It flows southwest through the Assam Valley as Brahmaputra and south through Bangladesh as the Jamuna (not to be mistaken with Yamuna of India). In the vast Ganges Delta, it merges with the Padma, the popular name of the river Ganges in Bangladesh and finally the Meghna and from here it is known as Meghna before emptying into the Bay of Bengal. In the past China and India fought a war over contested territory through which the river flows and Bangladesh being at the tail end faces human security pressures in this basin that will inevitably be magnified by upstream river practices. Despite these implications there is no bilateral or multilateral water management and water sharing accord that exists in the Brahmaputra basin. Moreover, this basin has received little scholarly attention compared with other river basins such as the Ganges, Indus, Mekong and the Amazon. Controversial dam-building activities and water diversion plans could threaten regional stability and trigger tension in the region. Thus, development, use and management of this transboundary water resource calls for an integrated approach within the conceptual framework of Integrated River Basin Management guided by transboundary water acts or any such other instrument. An attempt has therefore been made through this paper to provide greater understanding of the equities and drivers fueling water insecurity in the Brahmaputra River basin. Conclusions have been drawn and recommendations made based on desk research for various key stakeholders to consider at the sub-national, bilateral and multilateral levels to increase co-operation in the basin. The issues discussed may be of importance to policymakers, academicians, civil engineering students to discuss steps that could help manage and resolve competition of the water resources of the river Brahmaputra. This could, given the right impetus would go a long way in strengthening regional security on one hand and ensure availability of the basin's water for posterity on the other. Above all, it is strongly felt that a sustainable Brahmaputra basin ecosystem would only be possible to be maintained through this integrated approach in addition to maintaining bio-diversity of the region as a whole.

Key words: transboundary water, water sharing, stakeholders, regional security, sustainability

1. INTRODUCTION

Of all the natural resources, freshwater is our most precious natural resource. Its wise management and sharing are essential for obvious reasons. Despite this importance, globally we continue to abuse it. The world is faced with increasing water needs as population rapidly grows. Current trends show that we are not doing well in responding to the challenges. As far as Asia is concerned, India and China are in a rat race to become developed nations; implying more and more exploitation of natural resources, especially water. Against this background, transboundary water issues too often continue to be a source of major contention between the two riparian nations.

For the past few years, voices from China and India have stirred discussion about the potential for conflict and regional tension as a result of competition for water in the Brahmaputra basin. Author Brahma Chellaney's book (2011) Water: Asia's New Battleground raised alarm about China's dam-building efforts on the river Brahmaputra. The analysis presented in the book was to a large extent inspired by a book (2005) by Li Ling entitled "Tibet's Waters will Save China". Author Li Ling argues that water from Brahmaputra should be diverted by China for internal use in general and socio-economic development of the north-western provinces of China (that are chronically deficit of water), in specific. It is feared

that this one-sided approach and the actions planned would have far reaching consequences as far as India and Bangladesh are concerned, which are middle and lower riparian nations respectively. To quote Mark Twain "Whiskey is for drinking; water is for fighting over". However, there are better options to avoid tension and work together towards common goals. This is possible through better allocation and management of water considering the entire Brahmaputra basin as a management unit.

2. THE BRAHMAPUTRA BASIN

The River Brahmaputra known as the Yarlung Zangbo in China has its source (s) in Tibet and flows for a length of about 2,900 km and meets the river Ganga before draining into the Bay of Bengal through Bangladesh. Brahmaputra basin is spread over an area of about 580,000 sq. km, which covers China (50.5%), India (33.6%), Bangladesh (8.1%) and Bhutan (7.8%). India receives almost one-third of its total water from the river Brahmaputra annually.

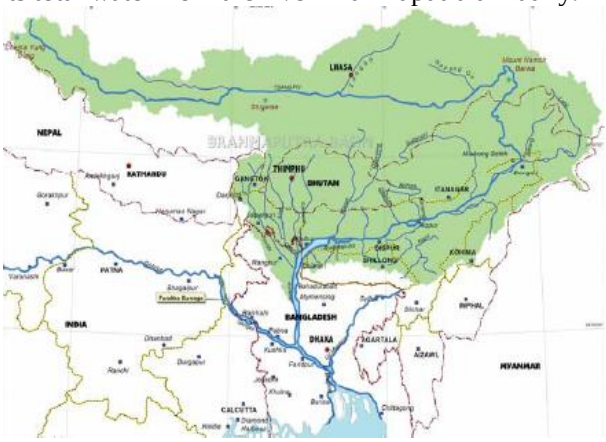


Figure-1: The Brahmaputra basin

3. POPULATION BURST, FOOD AND WATER STRESS- THE UNHOLY NEXUS

Both India and China are stressed for water coupled with skewed distribution of available water. The problem is exacerbated by depleting aquifers, climate change, rapid population and urban growth. China's current population is about 1.364 billion; marginally higher than India's population of 1.295 billion. It is projected that by 2050, India's population would be almost 1.60 billion while the population of China would fall to 1.340. Inevitably, India will experience shortage of food, water and energy. The scenarios are discussed below.

3.1 The Indian Scenario

India receives a large amount of rainfall during its monsoon season, but it lacks the ability to retain this water. Part of India's water scarcity can be attributed to poor surface water storage capacity, which is only about one-eleventh of China. China's renewable water sources are twice as large as India's, despite only having a slightly larger population. India's poor water management stems from an agriculture sector that consumes about 90% of its available water supply. Although the foreboding scenarios are conjured, climate change threatens to affect monsoon intensity and frequency. This is expected to affect Indian food security significantly. Further, rapid population growth, urban expansion and significant industrialisation will all compound India's water scarcity. By 2030, India's demand for water is expected to surpass supply by 50% of what it is today. India must enhance its water storage capacity and water use efficiency, as urbanisation is proving detrimental to India's aquifers and surface waters.

3.2 The Chinese Scenario

China is water-rich because it sources water from glacier, groundwater and surface water. At the same time it is water-poor because of uneven distribution of water creating scarcity throughout certain regions. The scenario is as follows.

- China currently holds 20% of the world's population but only 7% of fresh water resources
- China has total water reserves of 2.8 trillion cubic meters, which is 4th in the world. But per capita water reserves are only 2300 cubic meters, which is 1/4 of the world average, and comes in 121th place. China is therefore among the 13 most water-poor countries in the world.
- The agricultural sector accounts for 70% of China's water use and the coal industry uses a further 20% on which are dependent the Chinese industries at large. Both agriculture and industries are located in the arid north that receives only 20% of the country's total rainfall and snow melt, making the region very water scarce.
- Of China's more than 600 cities, more than 400 are in short supply of water and more than 200 have severe water shortages.

- About 70% of northern Chinese villages are water scarce, with per capita water availability less than one-tenth of the world average

- More than that, China's North-South distribution of water is severely skewed, given the fact that 44.3% of the population lives in the North and 59.6% of arable land is in the North. In contrast, the North has only 14.5% of China's water resources, with average per capita water reserves of 747 cubic meters (33.33% of the national average).

- This situation has been exacerbated by factors such as weak pollution controls, poor water conservation efforts and inefficient irrigation methods.

- Nearly 60% of China's groundwater is polluted. Almost 15% of water found in China's major rivers is not fit for use due to pollution and 7.4% of irrigated land is irrigated with polluted water.

- Ongoing water shortages in the north-west have already become an obstacle restricting economic and societal development. Only with large quantities of water, the north-west can improve its soil, check the expansion of deserts and finally rein in the raging dust storms.

China's food safety is threatened by pollution from rivers, farming and industrial waste. If current trends continue to 2030, China's water supply will no longer meet demand. Further, water is heavily subsidized in China, leading to an undervaluation of the resource. Consumers have little incentive to save water and industry sees it as an expendable resource, which leads to overuse and rising water pollution. The more developed China becomes, with higher disposable incomes, urban dwellings and domestic water use, as well as higher meat, vegetable and fruit consumption, the more water demand will increase. China therefore is left with no other option but to create more water infrastructure and improve upon water use efficiency at all levels.

4. STRATEGIC INTERESTS ALONG THE RIVER BRAHMAPUTRA

The Brahmaputra system makes up for 30% of India's water supply. Some experts opine that the Brahmaputra receives 70% of its flow from rainfall within India and as such there is no cause of worry if China dams Brahmaputra and diverts its water. However, the cause of worry is that this water enters the Brahmaputra only during monsoon season. As little as a 10% change to the upstream flow could have detrimental consequences for India in terms of increased salinity. This would affect agriculture downstream and the ecosystem in general.

5. DAM BUILDING BY CHINA

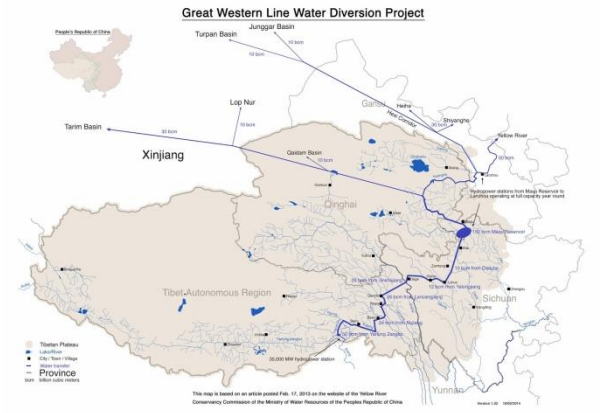
The Chinese Government announced in 2008 that it would commence building its US$1.5 billion Zangmu hydroelectricity dam along the middle reaches of the Yarlung Zangbo that would produce 2.5 billion kilowatt hours of electricity per year. The project was perceived by India as the start of Chinese river diversion projects that would ultimately dry up the Brahmaputra. By the end of 2015, all six power-generating units of the Zangmu Dam became operational. Despite New Delhi's wariness about Beijing's intentions, China insists that it would only construct run-of-the-river dams that generate electricity and pose little danger to downstream water security. However, run-of-the-river dams too have negative impacts.

In all, China intends to build twenty (20) dams on the Brahmaputra to generate 60,000 MW of power. Eleven (11) of the twenty (20) projects on the Brahmaputra will be located between its source and the Great Bend where the Brahmaputra turns northwards, executes a huge 'U' turn and falls from an elevation of 3,500 m in Tibetan plateau to about 700 m in the undulating hills of Arunachal Pradesh in India. Dams on the straight course will generate 20,000 MW, while the balance of 40,000 MW will be generated at the Great Bend itself. Additionally, twenty (20) smaller dams are planned upon its tributaries to generate another 5,000 MW. Thus, the total generation planned is 65,000 MW.

6. WATER DIVERSION- PRESENT AND PROPOSED

Aside from generation of hydro-electric power by damming the Brahmaputra by China, there is the more disturbing move with regard to diversion of the river water to meet domestic demand, especially for irrigation. China currently faces serious water scarcity challenges. In order to address these issues, the Chinese authorities embarked upon a massive water transfer project known as the South-North Water Diversion Project (nan shui bei diao gongcheng). The project that begun in 2002 consists of three planned routes: the Eastern, the Central and the Western.

The Eastern and Central routes focus on diverting water from the southern China's river Yangtze and river Han, respectively, to the river Yellow in the north. These two routes have already been completed and they currently supply water to northern cities like Beijing and Tianjin. The proposed Western route will concentrate on diverting the headwaters of three tributaries of the river Yangtze (Tongtian, Yalong and Dadu), which are all domestic rivers on the Tibetan Plateau to the Yellow river by 2050. The completed routes are shown below.



Going by the above facts it would not be out of place to mention that the Chinese authorities would not hesitate to divert the waters of the Brahmaputra in the near future if the situation warrants.

As far as the river Brahmaputra is concerned, a number of proposals, starting from 1990 have been placed including the most recent one by Chinese experts to divert water from the upper reaches of the river Brahmaputra to the country's north-western province of Xinjiang. The water diversion route in the proposal, named the "Grand Western Canal," is slightly different from the "Western Canal" mentioned earlier. The newly proposed route is to start from the river Brahmaputra, from which China can reroute the water to Xinjiang along the Qinghai-Tibet Railway line and the Hexi Corridor (part of the Northern Silk Road located in Gansu Province). Experts warn that if China proceeds with the project, water flow will be reduced by 60%; enough to create serious consequences downstream.

Although none of these proposals has been officially endorsed, there is room to believe that China's water shortage may become so severe by 2030 (due to climate change, desertification and intensification of the hydrologic cycle) that the government will have no choice but to divert the waters of the river Brahmaputra to meet its agricultural, irrigation and industrial requirements.

7. PERCEIVED SHORTCOMINGS IN THE WATER DIVERSION PROPOSAL

This author is apprehensive of the Brahmaputra diversion proposal in light of the following issues.

- Inter-basin transfer of water is among the most expensive ways to increase water availability.
- Diversion of water from the upper reaches of Brahmaputra i.e. Tibetan Plateau may not be technically feasible due mainly to the fact that the Tibetan Plateau is geologically unstable to support a project of this scale.
- Due to the disruptive effects of such projects, plans for diversion are likely to encounter severe resistance on social and ecological grounds.

8. ILL-EFFECTS OF WATER DIVERSION

The following are some of the perceived ill-effects of water diversion projects-

- Reductions in river flows due to diversions upstream can increase the concentrations of pollutants and deposition of sediments
- It can also alter river habitat and result in changes in and loss of adjacent floodplains.
- Inter-basin water transfer changes the hydrological regime of each system and can lead to widespread introduction of alien species and can relocate entire aquatic faunas, resulting in significant problems with invasive alien species.
- Changes in hydrological regimes may also have serious consequences for the ecology of estuaries.
- Transboundary harm may also flow upstream e.g. of a dam built that prevents migratory species from swimming back upstream, where they reproduce and repopulate fisheries of biological, social and economic relevance across the border.
- It is therefore suggested that both long-term measures like afforestation and/or reforestation and short-term measures like improved water use efficiency across all sectors, shallow groundwater pumping and intra-basin water transfer may be adopted that are cost-effective, technically feasible and ecologically friendly.

9. ILL-EFFECTS OF RUN-OF-THE-RIVER (RoR) PROJECTS

The upper riparian China has been insisting that they are considering run-of-the-river projects with no "storage or diversion" that would not cause any hard to India and Bangladesh. This is not entirely correct as RUN-OF-THE-RIVER (RoR) hydro projects can do immense harm. Far from being environmentally benign, as often claimed, they are perhaps among the most destructive human interventions. "RoR" is a most misleading description: the projects involve high dams; and apart from the usual impacts of dams, there are two special features in RoR hydro projects. First, there is a break in the river between the point of diversion to the turbines and the point of return of the waters to the river. This break can be very long, upwards of 10 km, even 100 km in some cases. There would be a series of such breaks in the river in case a cascade of projects as planned by China is executed. Second, in such projects the turbines operate intermittently in accordance with the demand for electricity, which means that the waters are held back in pondage and released when the turbines need to operate, resulting in huge diurnal variations (0-400%) in a day in downstream flows. There could be a case in which the river is dry for twenty hours in the day and in the remaining four hours there is a water wall rushing down the river. No aquatic life or riparian population can cope with that order of diurnal variation. A RoR project spells death for the river.

10. WHAT INTERNATIONAL LAW SAYS

The relevant document is the UN Convention on the Law of Non-Navigational Uses of International Watercourses (1997), which is a successor to the Helsinki Rules (1968). It was ratified by the required number of countries and has come into force despite China voting against it and India abstaining. However, if the water scarcity in parts of China worsens due to reasons mentioned earlier and China considers a south-north diversion of water necessary, it is unlikely to be deterred by the UN convention.

11. CONCLUSIONS AND SUGGESTIONS

The Brahmaputra system and its unique character, economic, cultural and ecological values are under threat, due to lack of vision and mad race to exploit its potential by India and China. Lack of a framework for managing the river system as a whole has left it vulnerable to short-term, competitive exploitation. In India, massive dams are proposed on its tributaries.

As in China, these plans are being made with little concern for the wider health of the river system or the interests of the millions of people who have depended on it for thousands of years. This is not an argument against development, but a concern that wrong kind of development, pursued in competition, risks destroying vital ecosystems that we only partially understand. It is a race in which everyone risks becoming a loser. Governments, to date, have not been sincere. It is time that we stop ruthless exploitation of the river and its tributaries and start examining this system comprehensively applying principles of Ecological Engineering and not of "hydrocracy". The following points are made.

- Execute a treaty involving Bangladesh, Bhutan, India and China and put in place a Commission similar to the Mekong Commission involving people dependent on the Brahmaputra allaying fear or else it can be a zero sum game. The way policymakers look at a river basin must change.
- Establish scientific collaboration across national boundaries, to include joint research, data sharing and expert exchange programmes.
- Carry out environmental impact assessment studies and prepare and execute environmental management plans for all the projects.
- Explore the alternatives to hydropower and promote long-term measures like afforestation and/or reforestation and short-term measures like improved water use efficiency across all sectors.
- Finally, adoption of Ecosystem Approach as enunciated by the UN Watercourses Convention would help rectify the already made mistakes and help prepare and execute better plans.

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