Threat from China's River Diversion Project

Yogesh Nair

Introduction

A topic of contemporary relevance across the world is that of water security. The issue of availability of fresh water has always been central to sustainable development, economic growth, social stability and poverty alleviation across the globe. In this regard, the issue of water scarcity has been a major source of concern for India, particularly due to the growth in water demand owing to a substantial rise in population and industrialisation. Towards this, the headlines of China's proposal to divert the waters of rivers originating in Tibet, including the Tsangpo, to fulfill the demands of its drier northeastern region have been worrying India in recent times. China's plan to divert the Yarlung Tsangpo river will have a major bearing on the flow of the Brahmaputra's water, leading to a water crisis in India's northeastern region. This article is an attempt to understand China's South-to-North River Diversion Project and the implications thereof to the Asian region.

Water Environment of China

The total reserve of water resources in China is about 2,800 billion cubic metres ($m^{3)}$ and ranks sixth in the world. However, in terms of per capita availability, it has only 2,700 m^3, far less than the world average for the country's dense population and vast territory; and ranks 121st in the world.[1] According to World Bank estimates, China possesses only 6.2 percent of global fresh water resources to supply 21 percent of the world's population. As China's population and economy have grown, so have its water requirements. Industrialisation and

Lieutenant Colonel **Yogesh Nair** is currently posted as GSO1 (Operations) with an Infantry Division, HQ.

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urbanisation have multiplied usage of clean water and, thus, made it further scarce. Water shortages have become prominent as the aquifer levels are dropping, lakes are disappearing, rivers are drying up, or becoming polluted. As per the statistics of the World Bank, due to widespread water pollution, 700 million people drink contaminated water every day. To add to this, the lopsided distribution of water in China has further compounded the problem. South China has 36.5 percent of the country's total area, but holds 80.9 percent of the country's total water resources. The northern and northwestern region makes up to 63.5 percent of the total territory, but holds only 19.1 percent of the country's total water resources.[2]

Acknowledging the gravity of water scarcity in some areas, China has responded in a number of ways in an attempt to tackle the problem. Local, regional and central governments have not only passed stringent laws and issued a number of policies/ regulations, but also made enormous efforts to reduce the effect by reforming water management strategies and adopting water saving technologies. However, unable to solve the water menace with standard measures like improving efficiency in irrigation, reducing water wastage, recycling of water, controlling pollution, etc, China is now focussing on large-scale water works like the South-to-North Water Diversion Project, to solve its water crisis; more specifically, China considers this as 'a must project' for economic development to continue in northern China.[3] Before getting to analyse the project *per se*, it is important to be acquainted with the river system of China so that the project construction and resultant diversion of water can be clearly comprehended. China's rivers can be categorised into exterior and interior water systems. China's terrain being high in the west and low in the east, most of its rivers flow eastwards and empty into the Pacific Ocean, including the Yangtze, Yellow, Heilong, Pearl, Liaohe and Haihe rivers. The total drainage area of the rivers flowing to the sea covers about 65 percent of the country's territory, by far most draining to the Pacific Ocean and small quantities to the Indian and Arctic Oceans. The Yarlung Tsangpo river in Tibet flows first east and then turns south and flows as the Brahmaputra through northeast India into the Bay of Bengal. The other rivers have not been deliberated upon, and the Brahmaputra remains the focus of the study.

The Project

The late Mao Zedong first proposed the idea of the diversion project in 1952, to ease the growing water shortages in China's north. However, it was only on August 23, 2002, after extensive research, planning and discussion that the project was approved for execution. The South-to-North Water Diversion Project stretches across four regional watersheds and is sub-divided into the Eastern, Central, and Western transport system. The Eastern route is designed to divert water from the lower Yangtze river; the central route from the Hanjiang river, a tributary of the middle reach of the Yangtze; and the Western route is intended to divert water from the upper reaches of the Yangtze and Tsangpo on the Tibetan plateau, northward.[4] Each leg of the system would consist of a constellation of reservoirs, canals, tunnels, water crossing structures, pumping stations and other infrastructure. Portions of the Eastern and Central systems are already under construction, while the Western system remains in the early stages of planning.

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Eastern Route: Water from the lower reaches of the Yangtze river in Jiangsu province will be diverted to the Hai and Huai river basins in northern China via the previously constructed Grand Canal, rivers and lakes. Experts indicate that most part of the first stage work has been completed and water is expected to begin flowing by 2010, with stage two following by 2020. The Eastern route is technologically the simplest and cheaper, compared to the other two routes, but for the stiff challenge of silting and the Grand Canal's heavily polluted waters faced by the project.

Central Route: The centrepiece of the South-North Water Transfer Project is the Central Canal, which will divert water to Beijing from the huge Yangtze river fed Danjiangkou Reservoir in Hubei province, mainly to ensure that the capital has enough water for the next 100 years. This route has complications due to technical, ecological and displacement problems of the project, amounting to relocation of 30,000 people along the path of the project.The Central route was due to be finished in 2010; however, the Chinese government pushed back the projected date of completion to 2014, citing pollution and related problems.

Western Route: The Western route is designed to divert water from the Tibet plateau fed upper reaches of the Yangtze river into the headwater of the shrinking

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Yellow river. Construction of the Western route entails transfer of water through the drainage divide between the Yangtze and Yellow rivers and building huge dams and long tunnels, cutting across water systems as well as the natural lie of the terrain. The original plan was proposed in the 1950s and 1960s, however, at that time, the project appeared too immense and costly to be undertaken. At present, armed with new technology, feasibility studies are being conducted by China to effect the diversion. In the first phase, China is planning to connect three tributaries of the Yangtze – the Jinsha, Yalong and Dadu rivers – to the Yellow river, across mountains and the Tibet-Qinghai plateau, which would then carry it across north China; while in the second phase, the Tsangpo (Brahmaputra) waters are planned to be diverted northward to feed the Yangtze. Though possible, the terrain complexities and technical difficulties make the project challenging. The Western route traverses along a most intricate topography, with extreme climatic conditions, and will require digging of tunnels and aqueducts in high-altitude mountains and at some places in sub-zero temperatures. The Western route is in the evolution stage and many details are still to be worked out. The technical feasibility studies are still under way.

Brahmaputra Diversion: The southern part of the western route envisages the diversion of the Yarlung Tsangpo, the largest river on the Tibetan plateau and the highest in the world with an average altitude of 4,000 metres. It runs 2,057 km in Tibet before flowing into India, where it becomes the Brahmaputra. One of its interesting characteristics is a sharp U turn (known as the Great Bend) near the Indian border. The Yarlung Tsangpo gorge also forms the longest and deepest canyon in the world. The river descends over 3,000 metres in approximately 200 km and this constitutes one of the greatest hydropower potentials anywhere in the world."[5] It is on this Great Bend that China is embarking on a mega "Western Project" with two constituents. The first component of the project would include construction of a gigantic dam for hydropower generation; the second for diversion of the waters northwards to feed its thirsty northwestern provinces through the western route of the South-North Water Transfer Project. The Brahmaputra is a major river of South Asia and has substantial significance for both India and Bangladesh. The Brahmaputra water accounts for nearly 30

percent of the total water resources and about 40 percent of the total hydropower potential of India. For Bangladesh, the river is even more crucial as it provides fresh water during the dry season and fertile land for farming. The Brahmaputra and its tributaries are the source of 90 per cent of surface waters. Any attempt to obstruct the natural flow of the Brahmaputra river will have dangerous consequences for both India and Bangladesh.

Impact and Challenges

Many water scholars in China believe that the problem of the nation's water shortage, especially that of northern China, whose very survivability is at stake, cannot be addressed until the Water Diversion Project is implemented in totality. The South-North Water Transfer Project is widely supported by the political and scientific community, arguing that water is desperately needed in northern China; but is opposed by archaeologists, farmers, environmentalist and people who live along the construction route. Further, the enormous complexities and the ill effects of the project on ecology and environment, including the use of peaceful nuclear explosions (PNE) for forging diversion, have forced China to deliberate on the impact and challenges as also the time-frame it is likely to take. This has caused China to sit back and recoil and has resulted in violation and extension of all scheduled projections. However, knowing China's determination and capabilities to iron out all odds, the finalisation of the project is just a matter of time. Once executed, the river diversion project will affect the region in more than one way and some of the impacts and challenges that are likely to crop up on execution of the project are analysed in the succeeding paragraphs.

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Implications for Tibet

Ecological Disaster and Destruction of Treasure Heritage: The reservoir of the proposed dam with a capacity of 40,000 megawatts (MW) would create a huge artificial lake, several hundred kilometres long, inundating vast areas of virgin forests within the canyon and beyond. The canyon, a great treasure heritage, which has more than 60 percent of the biological resources on the Tibetan plateau and the rare species of flora and fauna within the canyon, will be completely

destroyed. Similarly, there would be irreparable damage to the Tsangpo's numerous fish species, and to the thousands of other aquatic life forms that it supports, especially at the delta.[6]

Adverse Effect on the Populace of the Region (Socio-Economic Consequences: Although the population in the canyon is rather small, the indigenous people would suffer great hardship and be forced to leave their ancestral lands. Wetlands and grasslands, important to the large numbers of livestock herders in the region, are likely to shrink significantly and would affect the traditional livelihoods of many people. Further, the Great Bend, known also as 'Pemako', one of the last pristine regions of the world and considered the home of the Goddess Dorjee Pagmo, will cease to exist. For the Tibetans, it would mean the loss of a last sacred place and the home of their protecting deity.

Implications for Mainland China

Economical Viability: For China, the water diversion scheme is likely to be highly inefficient and uneconomical: firstly, due to the high construction cost and, secondly, as billions of cubic metres of water would be lost to evaporation, leakage, percolation, etc, through long canals and aqueducts. Doubts are also being raised about the efficacy and the resultant benefits of the project, as the entire Western route is marred with uncertainties.

Environmental Concerns: The potential use of nuclear devices to create tunnels for the project raises further serious concerns about the environmental impact of such a project for the region and those living downstream. There will also be a great danger of sending silt laden and contaminated waters (due to use of PNE) to northwestern China. This is perhaps one of the most important side-effects, not yet addressed by the Chinese scientists.[7]

Implications for India and Bangladesh

Downstream Water Crisis

Diversion of the Brahmaputra water will reduce the downstream flow of the river. The flow downstream will be restricted to meet the electricity demand of China, affecting the water requirements in India and Bangladesh. The amount of water in the Brahmaputra will fall significantly, affecting agriculture and fishing as salinity and silting will increase in the downstream areas. The reduction of flows in the Atrai, Karatoya and Teesta rivers could spell disaster for the rainfall-deficit northwestern hydrological region. Wetland and groundwater recharge

capacity would also decrease in the Brahmaputra dependent areas. The scheme could endanger the lives and livelihoods of millions of people residing in the area and those living downstream would be at the mercy of the Chinese as they would be able to flood or withhold the water supply downstream. For Bangladesh, the effect will be even worse as diversion of water will sap energy from the Brahmaputra, especially on its final journey into the delta. As the energy dissipates, the current tidal surge will be enhanced, penetrating further upstream, with salt water destroying precious Bangladeshi farmland, inundating low-lying land, villages, and townships. No new land will, thus, be reclaimed from the Bay of Bengal. The Bengal delta built in the last millions of years will, thus, begin to erode.

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Biodiversity

Diversion of water will destabilise the biodiversity of the area in a big way. Reduction in the flow of the Brahmaputra river will seriously impact the ecological needs. With the passage of time, this will result in deterioration of a healthy ecological balance, including loss of a plethora of plankton flora and fauna of the region. Reduced flow could also lead to collection of residual sludge and deposition of pollutants. Another consequence will be deposition of untreated effluents in the river due to discharge of industrial and agricultural waste, which will become a poisonous cocktail of biological and inorganic wastes, with reduction in fresh water influx. This may cause large scale displacement of human beings residing along the Brahmaputra valley, affecting the demography of the region.[8]

Earthquake Disaster

Experts opine that another serious issue is the construction of the dam in the Great Bend area, which is located in a highly earthquake prone area. A huge reservoir and a few PNEs[9], as proposed by Chinese scientists to make tunnels through the Himalayas for the project, could provoke devastating earthquakes. India also fears that use of nuclear technology in the project will lead to environmental

concerns in the eastern Himalayan region. Further, as the region falls in the regular seismic zone, any earthquake of 8.0 on the Richter scale can destroy the proposed Chinese dam and cause devastating consequences downstream.

Flash Floods in India's Northeastern Region

A breach of the dam in Tibet or a sudden release of water during spells of heavy rain in China/Tibet can lead to floods in India's northeastern region. An emergency discharge would be disastrous if it coincides with the monsoon season in India. It may be noted that flooding normally occurs not so much because of snow-melt waters in the Tsango section, but more from the monsoon rains from the southern side of the Himalayas carried down by the tributaries. Moreover, the catastrophic long-term destruction in terms of infrastructure and communications, including loss of fertile land, will push the region to years of backwardness.[10] The Brahmaputra is also one of the most sediment-charged rivers of the world. The flooding could also get worse due to relentless silting which will be accelerated by the slowing down (reduced velocity) of the river flow.

Adverse Effect on Economy

The northeastern regions of India are largely dependent on the Brahmaputra river for the livelihoods of the inhabitants. Large scale diversion of water would adversely affect the surface water table and agriculture of the region. Shortage of water in the main stream would adversely affect the production of food grains, fisheries, inland waterways, hydropower, etc and, thus, the economy of the India's northeastern states. For Bangladesh, the consequence will be even worse as it will render Bangladesh incapable of meaningful agricultural production, leading to a major food crisis.

Effect on India's Water Projects

Reduced flow in the Brahmaputra river will affect India's plans of undertaking water projects on the Brahmaputra for generation of electricity and other river training works. In fact, this would also impair India's long-term river interlinking project, planned to link approximately 30 of its own rivers. However, any move by India with regards to impounding or a river interlinking project will be at the cost of its relations with Bangladesh, as water issues have been a major irritant and primary cause of difficult issues between the two nations.

Threat to Nation's Security

The strategic location of the dam, at Namche Barwa and its proximity to the Indian borders, undermines the security of India. China can use the dam as a military asset in the event of a war, to exploit the potential of the 'stored' water by releasing it towards India, causing great disaster in the region. Secondly, shortage of water in the Ganges has already affected the lives and livelihoods of millions in Bangladesh, pushing them to migrate to India, especially to its northeastern region. This migration of Bangladeshis has changed the demographic composition of vast tracts in northeast India (especially Assam) and has triggered serious ethnic conflicts. Shortage of water in the Brahmaputra will accentuate these problems to dangerous levels, threatening the security of India to a large extent.

Implications for Other South Asian Countries and International Communities

Southeast Asian Countries

The Mekong river originates in the Tibetan plateau in China and flows through five other countries (Myanmar, Thailand, Laos, Cambodia and Vietnam) before terminating in the South China Sea. The Mekong river basin, with only two major dams on it, has limited impact on the lower riparian states and is presently cited as an example of international water cooperation between developing countries. (Although, at present the Mekong River Commission is managing the co-riparians affairs rather well, the commission truly falls short without China).[11] However, the Western Route of China's South-to-North Diversion Project will have a major economic and environmental impact for the countries downstream. This could develop into international tensions about the "equitable utilisation" of water between upstream and downstream parties. The downstream effects of this diversion would be devastating, as 80 percent of the population in the basin consists of subsistence farmers or fishermen living in rural areas and relying on the river's natural ebb and flow for their livelihoods. Laos uses the Mekong waters for hydrological power, for which the country has been termed the "Kuwait of Southeast Asia," because of its high hydropower potential per capita.[12] For Laos, hydropower is not only a source of national pride, but is also a major export. The loss of strong river currents would mean a reduction in power supply. In Thailand, the Mekong basin covers the poorest areas with high population density and communities that are widely dependent on agriculture are supported by the Mekong. In Cambodia, the people are also highly dependent on the Mekong

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because it enriches fisheries through annual flooding. The river enters the South China Sea in Vietnam where it spreads over the delta system, creating productive fisheries and agricultural areas that produce more than half of Vietnam's annual rice production.[13] Over 18 million people live in this delta region. If and when the Western Route is completed, this delicate balance of water resource sharing could be upset and lead to a bitter multilateral water dispute.

International Implications

The submergence of virgin land and, in turn, the gradual decaying of forests in Tibet due to the reservoir of the dam will produce methane, a far more powerful greenhouse gas than carbon dioxide, contributing to global warming. Climate change and the resultant melting of the Himalayan glaciers will affect the entire planet. Besides, the devastating effect of floods and earthquake, and the economic impact of water diversions on the lower riparian countries will affect not only the Asian region but have global ramifications. Further, the Brahmaputra river being trans-national in nature, any attempt to obstruct its natural flow would have an international dimension. The river diversion issue not only pertains to the environment but also to national and international security, as it can aggravate into a war-like situation if some mutually acceptable solution is not found in time.

The Way Ahead

China occupies a key place in the hydrography of Asia. It is in the control of the Tibetan plateau, which is the principal watershed of the Asian region and the source of its 10 major rivers, including the Brahmaputra (Yarlung Tsangpo). Any project on these rivers to meet its internal requirements will have external consequences as well. Diversion of water of the Brahmaputra river away from India will worsen a situation that has remained tense since the 1962 Indo-China War. The melting glaciers in the Himalayas as a result of accelerating global climate change will have a dramatic effect on this river's water supply. This will increase water scarcity as well as the likelihood of floods; impact agrarian livelihoods and strain the fragile equilibrium between the two Asian giants. Besides managing

own water resources and addressing own water management issues, India needs to deliberate on its water diplomacy for the region before China formalises the mega project.

In the absence of institutionalised cooperation over shared resources, peace would be the casualty in Asia, if water became the new battleground.

One of the ways to forestall or manage impending water crises/disputes in Asia is to build cooperative river-basin arrangements involving all the riparian neighbours. Such institutional arrangements ought to centre on transparency, information sharing, pollution control and a pledge not to redirect the natural flow of trans-boundary rivers or undertake projects that would diminish cross-border water flows. The successful inter-state basin agreements (such as over the Indus, Nile and Senegal rivers) are founded on such principles. Given the scale of the emerging challenges, a broader, effectual treaty with China along the lines of the Indus Water Treaty may be needed to preemptively address any sharing, diversion, or communication issues. Such a treaty could serve as the basis for enhanced trade relations in India's northeastern region that could mitigate geo-political tensions there. Countries of the Brahmaputra basin, viz., China, India and Bangladesh, need to opt for joint river management for sustainable development of the basin and to combat the 'climatic cataclysm' in the Himalayan region as well as enact legally binding agreements for sharing water resources and development of the economic potential of the river(s).[14] Such an arrangement becomes more essential because as per international law, as an upper riparian state, China has every right on the waters on these rivers; but it ought to take the affected countries into confidence before projects are planned/executed.

In the absence of institutionalised cooperation over shared resources, peace would be the casualty in Asia, if water became the new battleground. Any Chinese reluctance to create a formal institution to manage the issue can be counteracted by a cohesive bloc of the South/Southeast Asian countries, all of which will be harmed equally by China's water weapon. Water is an issue on which the estranged neighbours must come together. There is also need for India, Bangladesh and other affected countries to speak with one voice; may be even have a common regional water vision. By having a united understanding and agreements for the cause of ensuring water flow, the South Asian countries can, in turn, resolve the water disputes that plague their own bilateral relations.

Further, as the water diversion project is likely to affect the world at large, though indirectly, building international pressure on China for a formal water sharing agreement is a must. It is also essential to create global awareness highlighting project concerns and try and firm up international opinion involving the United States (US), European Union (EU), United Nations (UN) and other world bodies against the project. To make the case stronger, the Tibetans need to be sensitised and the internal sentiment within China against the project that has surfaced so dramatically in the last decade needs to be exploited.

Conclusion

Since the source of Asia's major rivers is in China controlled Tibet, China's plan to divert Tibet's waters to its water-scarce areas could trigger water problems in Asia. Environmental experts estimate that roughly 50 percent of the total water flow will fall drastically if China is successful in constructing a dam on the river Brahmaputra. China's effort to redirect the flow of a river which provides the base for agrarian life in its neighbouring countries is a provocative move indeed. The project is not only likely to spawn large environmental distress but may also impact security in Asia. Some have gone so far as say that this action qualifies as an act of war and Sino-Indian conflict over the sharing of the Brahmaputra waters seems imminent no sooner than China commences its work on the river's Great Bend.

One may argue on the magnitude of the problem; however, the scale and impact of the Brahmaputra's diversion will have dangerous consequences for millions of people downstream and the nation's security at large. India and Bangladesh will remain at the mercy of China, which could withhold water for power generation and irrigation during the dry season and release water during the monsoons with catastrophic consequences for Eastern South Asia. Further, the border dispute between China and India in this area is not settled and an aggressive push of industrialisation of the area may exacerbate tensions between the countries. To protect the interests and sovereignty of India, it becomes essential for India to engage in a dialogue with China on the issue.

If China intends to have a normalised border and seeks peace and security in the region, then it has to give proper consideration to the requirement of the lower riparians. It has to recognise the lower riparian rights to be pre-informed and pre-consulted on activities on international rivers. Unilateral advancement on the part of China can leads to political confrontation in the region. A confrontation will further strain the delicate relationship. It would impede, to a great extent, China's

position in South and Southeast Asia and even in world politics, as turmoil in the neighbourhood would thwart the economic and political development of China. Moreover, any conflict in the region will not remain confined to the belligerent states, and the involvement of the global players cannot be ruled out. Hence, there is a need for all the lower riparians to act in unison, galvanise world opinion and pressurise Beijing to enter into an agreement on sharing of water resources, before the controversial project is undertaken by China.

Notes

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