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China's Dams & Regional Security Implications
An Indian Perspective

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One of the characteristics of China's 'peaceful rise' has been its endeavour to control environment, demonstrated mainly by its dam-building policy. The country is home to half of the world's roughly 50,000 large dams and many more medium and small-sized ones aimed at flood control, energy production and irrigation. In addition, the proposed North-South Canal (which would entail extensive damming of rivers) is touted to solve the water crisis in the North and address climate change problems due to glacial melting such as flooding in the South.

China has been actively diverting river waters in its territory for different purposes. Before the People's Republic of China came into being in 1949, it could boast of a mere 22 dams of any significant size. Now, if all the dams of all sizes are taken into account, the number could well go up to 85,000 (Chellaney, 2011). When China annexed Tibet, the latter's dependence on the Tibetan waters was negligible and almost all the waters flowed to the lower riparian countries. Today, with signs of environmental change in northern China, the government has decided to exercise its rights over the watercourses in the Tibetan Plateau, primarily to divert waters from the water-rich South to water-deficient North. Way back, om 1952, Mao Zedong pointed out that, "The south has a lot of water, the north little....If possible, it is okay to lend a little water" (Chellaney, 2012: 182). He had recognised the relevance of the Tibetan Plateau for China's survival.

However, the World Commission on Dams has found several gaping loopholes in the whole exercise of building dams and their functioning, whether in terms of power generation or irrigation or flood control, most importantly its disastrous socio-economic implications. Many of these dams are built in seismically volatile areas and are allegedly products of "tofu" construction (poorly constructed, involving less time and money). Dam collapses have been reported in many regions as exemplified by the 2013 incident in Shanxi province. Dams have been held responsible for several disasters including pollution, droughts, flooding, earthquakes, soil erosion and landslides in several parts of the country, killing thousands of people, especially

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in Southwest China. This has in turn resulted in various forms of social and economic upheaval in China, not only due to human displacement but also the negative effects of damming on the environment, including flora and fauna. There have been widespread protests against dams; but they have largely been overlooked or quelled. Environmental changes are compounding the natural risks to dam-building despite the improvement in safety measures and steps taken to mitigate environmental impact over the years. Yet, the Chinese leadership has given the go ahead for the construction of an array of dams, including the world's tallest dam along Sichuan's Dadu River. These dams threaten not only China's economic, political and social security but also regional security as they are built on rivers such as the Yarlung Tsangpo, Salween and Mekong that flow down to countries in South and Southeast Asia.

Understanding China's Damming Philosophy

Confucianists propagated control of the water flow to both protect populations and harness hydropower. Conversely, the Daoists firmly believed that humans should simply move away from flood plains and allow rivers to flow their natural course. According to Judith Shapiro, it was during Mao's 27-year long reign that environmental degradation started in China, starting with large dam constructions in the 1950s and collapse of numerous small dams built with "tofu" construction during the Great Leap Forward ('Harnessing the Waters: Nature Conquest in China's Past and Present', 2003).

This legacy was continued by successive leaders and governments of the Communist Part of China (CPC). In fact, one of China's many hydraulics engineers, Professor Liu Zihui, while speaking about the largest hydraulics project in the history of humanity, a $63 billion canal that would bring water from the south of China to the north of China, commented, "I don't feel we are conquering nature. We think nature itself isn't fair. God isn't fair. What is that? He's given Southern China so much water but given the North so little. It's good land – nice flat land – up there. But it's got so little water. So we say, as God isn't fair, we are trying to balance out God's unfairness" (Paskal, 2012).

This brief provides a historical-cum-ongoing account as well as an assessment of the future of China's dam-building exercise, its rationale and consequences at all levels – geographically, environmentally, socially, economically and politically; andargues that they threaten China's security and its "peaceful rise/development."

Socio-economic Problems

Resettlement remains one of the greatest bones of contention vis-à-vis any large-scale developmental project. Construction of reservoirs and dams has led to three major consequences in China – economic impoverishment, social instability and environmental degradation – particularly regarding resettlement. The displaced population is forced to cope with the loss of their land that in most cases is arable. After resettlement, their land area per capita declines, which eventually results in degradation in land quality.

Additionally, the resettlement schemes have reportedly been inadequate and largely mismanaged. Studies have also revealed that there has been a noticeable gap in the compensations paid for urban and rural populations. The displaced are known to have faced immense difficulties in restoring their livelihoods, as well as in getting access to food and water and other amenities such as electricity and transport. In short, "landlessness, joblessness and homelessness" became widespread phenomena in regions that were affected by construction of dams and reservoirs (Heming, Waley and Rees, 2001: 199). Social instability is caused mainly due to the displaced population's dissatisfaction with the resettlement schemes or the authorities' unreceptive attitude towards them. Many a time, this results in conflicts between different groups as well.

Environmental destruction is, among others, a result of construction of dams, small or big. Those relocated in this process lose their traditional connections with the land that would eventually be flooded by the dam. In many cases, people are dislodged from relatively flat and fertile areas and resettled in inhospitable terrain or infertile hill slopes. People begin to cultivate on steep hill slopes

and in other upland areas, leading to destruction of forests and grasslands, causing soil erosion and increased water runoff. In other cases, due to migration of the displaced, places with plentiful resources and fertile lands become overcrowded and when the population pressure crosses the manageable threshold, land and other environmental resources get degraded irreparably. There are instances in which people have had to be relocated a second time due to the aforementioned reasons as seen in the case of the Sanmenxia project (Heming, Waley and Rees, 2001: 199-201).

The vital interests of the local residents and local governments are largely overlooked. Hence, one of the biggest drawbacks of China's dam policy is that the displaced population is viewed as an obstruction to the dam or to the central government's development agenda; in short, to national interest. Instead, they should ideally be viewed as either contributors or victims of the projects that displace them. China's three-pronged resettlement strategy used in the Three Gorges project are: first, 'settling migrants in nearby areas on land to be farmed'; second, 'allowing migrants to move to and live with relatives in urban areas'; and third, 'moving migrants far away' (Heming, Waley and Rees, 2001: 199-202). However, the authorities' inability to provide sufficient compensation to the uprooted population, such as jobs to urban populace and/or alternative quality (mainly fertile) lands to farmers, defeated this strategy and later gave rise to widespread discontent among the people. Therefore, such displaced populations have a contrasting perspective to the country's global image as an 'engineering' superpower. In response to the discontent, the government is now resorting to 'developmental resettlement' or 'resettlement with development'. With this, its efforts have been to invest the relocation funds in major developmental projects such as cultivating cash crops, improving existing farmlands and setting up industrial units/ enterprises instead of allocating the financial compensation directly to the displaced (Heming, Waley and Rees, 2001: 199).

There have been several protests against damming in China due to the government's inefficient and insufficient resettlement policies. But such protests have largely been suppressed by the state authorities in the past. For example, in 2011 nearly 2000 migrants displaced by Xiangjiaba dam on the upper Yangtze River in Yunnan Province took to the streets and clashed with the police. The primary reason for the protests was that the new location they had been relocated to was a seismic zone and it had experienced a mild earthquake; and they feared that their "tofu" buildings might collapse like the "tofu" schools in the neighbouring Sichuan province in the 2008 earthquake that killed more than 7000 children (Lafleur, 2011). In case of the Three Gorges Dam, protests were rampant throughout the relocation period due to inadequate compensation paid by the government and alleged misappropriation of funds allocated for compensation. The farmers who reportedly "complained to foreign journalists about corruption among officials in charge of resettlement" were arrested on the charge of "leaking state secrets" ('China's Three Gorges' Project: Dam Shame', 2002).

Various studies show that China's dams are increasingly adding to its geological vulnerability. For instance, the 2008 Wenchuan earthquake was supposedly triggered by the nearby Zipingpu Dam. Southwest China is seismically vulnerable and not conducive for large projects... Many dams in Sichuan and Yunnan have thus come under the scanner for their ability to induce earthquakes.

Environmental Problems

In addition to other types, environmental security should be deemed as an important component of national security. Various studies show that China's dams are increasingly adding to its geological vulnerability. For instance, the 2008 Wenchuan earthquake was supposedly triggered by the nearby Zipingpu Dam (Adams 2013). Southwest China is seismically vulnerable and not conducive for large projects. An earthquake induced by large reservoirs erected on fault-lines is referred to as 'reservoir-induced seismicity'; "a reservoir with a capacity of over 1 billion cubic metres and a dam more than 100 metres tall would have a 30 per cent to 40 per cent chance of inducing an earthquake" (Qingyun, 2013). Many dams in Sichuan and Yunnan have thus come under the scanner for their ability to induce earthquakes. Additionally, these dams, if damaged or obliterated by earthquakes, can lead to a large numbers of deaths in the region.

The faulty construction of Chinas many dams, sometimes called "tofu" construction, add to the problems. According to Zhou Jianping, dam disasters are largely attributed to "low standards, including inadequately prepared surveys, unscientific design and construction plans, mismanaged construction, absence of quality control and supervision, and even fraud in the procurement of building materials" ('Dams gone wrong: Is danger lurking in China's dams?', 2011). In 2007, Sanbanxi Dam in Southeast Guizhou collapsed after only 13 hours of operation due to poor construction quality. Similarly, in 2013, a 100m-long stretch of the dam collapsed and flooded 19 downstream villages in Shanxi Province ('1 Killed in Dam Collapse in Shanxi', 2013). The Three Gorges Dam has been held responsible for "risk of geological disaster" as it is linked to "soil erosion, quakes, drought and social upheaval" as the State Cabinet itself has admitted (Watts, 2011). Landslips, minor earthquakes and cracks are allegedly appearing in roads and buildings between the dam and the city of Chongqing (Collard, 2010). A crack in this dam could affect the lives and livelihoods of nearly 300,000 people. Among other environmental problems, China's mega city, Shanghai could face severe water problems owing to rampant hydropower development in the upper reaches of Yangtze River. Due to extensive construction of dam reservoirs, lesser amount of freshwater flows to Shanghai from the upper reaches. This could result in saltwater intrusion ('Hydropower Poses a Threat to Shanghai Water', 2013).

Silt has been a major impediment in China's dam operations. The Sanmenxia reservoir, one of the many dams on the Yellow River, was filled with silt in just six years, drastically reducing its ability to store water. Later, the dam could generate electricity for only a few months during winters (as during this time the silt load in the river is at the minimum level). Silt effectively diminishes the useful life of the turbines (Chengrui and Dregne, 2001: 16). As stated earlier in the paper, such large projects ultimately result in large-scale flooding of "the best farmland with the favourable climatic conditions." As the population relocates to upland areas and hill slopes, referred to as "upland displacement", more land would be required to produce food and with increasing population, more and more land will have to be converted into farmlands. This leads to soil erosion, which could also escalate into geological disasters such as landslides and debris flows. This could be aggravated by road-building (Yonghui, Baiping, Xiaoding and Peng, 2006: 112).

Contamination of water by ore tailings is being touted as yet another threat to water security in China as well as in its neighbourhood. For example, the Tibetan Plateau has reserves of 126 different minerals including copper, iron, boron, chromite, corundum, crystal, uranium, gold, and molybdenum, among others. The ore separation process produces toxic tailings capable of contaminating water resources. Dams are built to hold tailings too. If such a dam collapses, the toxic ore residue has the potential to contaminate all the freshwater bodies in its vicinity. In 2011, such a dam collapsed at a manganese mine and created 43 per cent emergency cases by poisoning drinking water in a nearby river, destroying houses and relocating more than 270 residents in the area ('China is Being Wasted by its Dam Disasters, 2011).

The Three Gorges Dam, in addition to other aforementioned issues, is also known to have had an adverse effect on fresh water resources, especially fish. A huge body of stagnant water has allegedly toxic algae blooms that affect aquatic biodiversity as well as make the water not potable. Moreover, fluctuations in the reservoir level (by 100 feet every year) have reportedly destabilised the slopes and caused several landslides. In reaction to the growing opposition against many polluting industries, China, under former President Hu Jintao and former Premier Wen Jiabao, allowed many environmental organisations to flourish in the country. It also created a Ministry of Environmental Protection in 2008 to strengthen environmental regulations and reduce carbon emissions among other priorities. It put the construction of several dams in the country on hold (Bosshard, 2009/2010: 48-49).

Regional Implications of China's Dams: An Indian Perspective

China's management of the Mekong River that originates in the Tibet has faced criticism from the entire world, particularly Southeast Asia, which is at its receiving end. Four countries of the lower Mekong basin – Laos, Cambodia, Thailand and Vietnam – depend on this river for food, water and transportation; and they have been distressed by China's activities on the river. Dams on this river have been held responsible for drought in some of these countries. In 2010, the river had acutely low water levels due to comparatively lesser

monsoonal rainfall the previous year and light rainfall in the dry season. This is said to have been exacerbated by dams upstream in China. It generated losses worth millions of dollars (Leitsinger, 2010). In Thailand, fishing communities are the most-affected as they are forced to stop fishery when the water levels go down significantly. Vietnam's farming area that is fed by the Mekong has been threatened time and again. Ponnudurai (2010) points out the relevance of the Mekong for Vietnam – the low-lying Mekong delta in Vietnam is home to over 18 million people and contains vast farmlands source of nearly half of Vietnam's rice crop. It is already vulnerable to sea level rise. When the freshwater flow from Tibet decreases, seawater intrusion is expected to increase and reduce the agricultural yield further. China has refused to be a full member of the Mekong River Commission, which was formed by the lower basin countries in 1995 to monitor hydropower development in the lower Mekong basin. As Richardson (2009) reports, efforts by the four countries to urge China to assess downstream river changes caused by its dams and engage in technical cooperation have failed. It has been a dialogue partner, a position that allows it to evade scrutiny of its dams and its rights to harness hydropower potential of the river, 21 per cent of which lies in China.

The environment is changing at an unprecedented pace due to both natural and human-induced causes, if not put in perspective could definitely culminate in tensions or conflicts between China and its neighbours. Simultaneously, China, a closed system that does not disclose any information regarding its river management policies, has been in the process of changing various facets of environment to fulfil its requirements. Beijing has always maintained 'strategic silence' on its water diversion proposals and projects that makes any form of cooperation between China and its neighbours, including India, a difficult proposition. Approximately, 354 BCM of waters flow from Tibet to India out of which 131 BCM is accounted in the Brahmaputra River; China is planning to build twenty-eight dams on this river alone (Chellaney, 2012: 44).

China's determination to implement the Great South-North Water Diversion (SNWD) Project has already unleashed several environmentally catastrophic consequences for itself and now it is alleged that it could have serious environmental implications for its neighbouring countries as well. The project consists of three stages – eastern, central and western routes. Some reports suggest that the first two stages involve diversion of waters from China's internal rivers (mainly Yangtze River to Yellow River), while the third one has trans-boundary ramifications, especially for South Asia. The western route targets the Salween, the Mekong, the Brahmaputra and the Jinsha (Chellaney, 2012: 139). However, conflicting reports state that the project originally involved only internal rivers (as proposed by Mao) and that the third leg involves water diversion from the upper reaches of the Yangtze only, albeit revision of this proposal by the later regimes to include the Brahmaputra cannot be discarded (Krishnan, 2013). It is also speculated that China is planning to build the world's largest dam and hydropower station on the Brahmaputra at the Great Bend (the place where the river takes a U-turn to enter the plains of Assam via Arunachal Pradesh) ('Monitor Brahmaputra to Rule Out Chinese Dam', 2013). China's lack of transparency has left experts in India and Bangladesh guessing about its future actions with respect to its diversion plans.

One important factor that needs to be taken into account while analysing the diversion projects from the point of view of the lower riparian countries is that the average runoff of the Brahmaputra increases drastically when it reaches Bangladesh, due to monsoonal waters and the water contributed by the tributaries. Therefore, a dam intended for hydropower generation might not make much difference to the runoff but concerns regarding contamination, sedimentation and flash floods remain. It could even increase the dry season flow if China is engaging in only non-consumptive usage of water as it claims. If China decides to divert waters during the monsoons only, such an act is also not expected to cause any water insecurity for India and Bangladesh. The excess waters during monsoons have always been a source of concern for those two countries as they cause annual floods, at times proven destructive, especially in the case of the Assam floodplains and low-lying areas of Bangladesh. However, if China diverts during the entire year, it could pose serious challenges for India and Bangladesh. The dry season flow could diminish by a great extent in the north-eastern parts of India. For Bangladesh, the dry season could be drier. It has been argued that since India has 58 per cent of the total Brahmaputra drainage basin and is dependent on it for almost 30 per cent of the country's water resources and 41 per cent of its total hydropower resources while

China controls only 20 per cent of the basin, India has a greater right to the river's resources (Chellaney, 2012: 191).

The Yangtze River, on which the Three Gorges Dam has been built, is the source of waters for the first two legs of this grand project. Brahmaputra River could be afflicted by the same problems the Yangtze has faced over the past few years, in the future, that that would directly affect India and Bangladesh. Moreover, the areas where these giant dams have been built or are being proposed to be built are seismically highly unstable. Any tectonic activity along the border would affect both India and China adversely. Allegations ranging from causing floods to the use of nuclear explosives (in 2005) to create tunnels for diversion of the waters of River Brahmaputra have been levelled against China. It was accused of creating flash floods in Arunachal Pradesh, which were caused by a breach in the upstream dam in Tibet that raised the level of the Brahmaputra by more than 30 metres (Vasudeva 2012). Similarly, Himachal Pradesh has also been affected allegedly by Chinese dam-building activities in the form of floods in 2000, 2001 and 2005 (Thakkar, 2010). The idea of diversion of the waters of the Brahmaputra might still be alive in the Chinese engineering and circles, but as of now several factors including technical impediments, ecological sensitivity, difficult terrain and domestic environmental movements hold the potential to stymie such a scheme. The use of nuclear explosives might purely be a case of sensationalism. However, if China resorts to even conventional engineering methods to implement this project, the implications for the whole region are expected to be disastrous.

Conclusion

China's water/river policies could adversely affect not only the population of other countries in its neighbourhood but also its own population as seen in the case of the Three Gorges Dam. China is confronting immense socio-economic and environmental challenges due of its damming policies. Additionally, the country is also reeling under cases of corruption and environmental change-related disasters caused by its development policies. Dam maintenance has inevitably become one of the biggest concerns for the Chinese officials as more and more instances of cracks in the construction of dams are emerging.

The Chinese have forgotten one of world's biggest tragedies that unfolded on its land in 1975, when the Banqiao Dam in Henan Province collapsed due to a host of factors ('The Forgotten Legacy of the Banqiao Dam Collapse', 2013). As accounted by Kaiman (2013), they are now planning to build the world's tallest dam along the Dadu, even while accepting its ecological (including spawning and movement of rare fish species and growth of endangered plants) and socio-economic consequences. In 2013 alone, the central authorities approved the construction of 13 dams on the Salween River, increasing the risk of natural disasters such as landslides and earthquakes in the south-western region. These projects had been stalled for a long time due to pressure from environmental groups and locals.

From an Indian perspective, it is extremely difficult to predict the India-China hydro-relations not only because of the uncertainty over the impacts of environmental change on the rivers flowing from the Chinese territory to India but also due to the governance system of China that functions by and large in complete secrecy. Although Indian and Chinese officials have held talks and the latter have agreed to share hydrological information through a Memorandum of Understanding (MoU) on the Brahmaputra and the Sutlej in flood season, the absence of a bilateral treaty makes it next to impossible for India to verify China's claims. Beijing is reportedly building dams in Dagu, Jiacha, Jiexu and Zangmu. India's call for a water commission or an inter-governmental dialogue or a treaty was struck down by China in 2013 ('China Spikes India's Proposal for Joint Mechanism on Brahmaputra', 2013). In such a scenario, China could arm-twist India's neighbours into supporting it by raising the case of the Tibetan waters. The spree of dams proposed by China could potentially diminish India's manoeuvrability in the region in terms of its own plans to deploy hydroelectric projects in its territory to fulfil its energy requirements (particularly in the less developed regions in the Northeast). It could also spark political tensions with India's

neighbours. Therefore India must galvanise the support of its neighbouring countries such as Nepal, Bhutan and Bangladesh to prevent China from implementing large-scale diversion projects that could affect water security in the South Asian region as a whole. India should, with the aforementioned countries, also coax the international community to pressurise China to respect the 'commons' principle when it comes to trans-boundary waters. It would also be prudent for India to include the China factor in its water-sharing agreements with its own neighbours so that in the future, if a problematic situation arises (such as flash floods or severely reduced water levels), the entire onus would not fall upon New Delhi.

At a time when the West has applied brakes on its hydropower projects and countries such as India and other democratic countries in the developing world have put on hold several projects due to stiff domestic opposition, China is increasing its hydropower capacity day by day and has indeed evolved into the biggest dam builder at home. If the cost-benefit analysis of Chinese dams is carried out in a more qualitative manner, then the losses incurred by China would be much more than quantitative benefits in terms of energy and agricultural output. In the light of increasing socio-economic tensions and security concerns, China needs to take a fresh look into its hydropower policy and secure its own population. Moreover, the zero-sum mentality towards its neighbours could lead to a tense regional environment. Both these factors have the potential to derail China's growth story in the long run.

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