

Brahmaputra River: A bone of contention between India and China

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Abstract: The building of dams and diversion projects in Tibet by China is a matter of grave concern for lower riparian states. The requirement of fresh water as the pollution grows and population rise has forced China to have the Tsangpo-Brahmaputra River project. India is also racing to construct hydropower dams on the Brahmaputra River to take advantage of the river's hydropower potentials. The nub of the resource competition thus connects with mass dam building and diversion plans. The Brahmaputra is now the target of project planning by both China and India. This article is a modest attempt for enquiring into the reaction of both people on the water diversion issue, disastrous ecological consequences due to race for dams building and the urgent necessity for having a water treaty between Asian giants. In addition, it establishes the fact that sharing of information, ecosystem-friendly policies, thought and mutual understanding will dispel the suspicion and develop trust between two countries, creating an enabling environment for better management of Brahmaputra River.

Key words: Water Governance, Trans-boundary, River dispute, India, China.

1. INTRODUCTION

The 2,880 km-long Brahmaputra originates in Tibet, where it is known as the Yarlung Tsangpo. It flows eastwards through southern Tibet for a distance of 1,625 kilometres and at its easternmost point it swings around to make a spectacular U-turn at the Shuomatan Point or Great Bend before it enters India's easternmost state, Arunachal Pradesh. Here it is known as the Siang River. After gathering the waters of several rivers it announces itself as the Brahmaputra in the state of Assam. The river snakes lazily through Assam to then enter Bangladesh, where it is known as the Jamuna. In Bangladesh it is joined by the Ganges (known as the Padma in Bangladesh) and Meghna and together these rivers form the world's largest delta before emptying their waters into the Bay of Bengal (Ramachandran, 2015). The vital task for sustainable management of the basin is conflict over water between two Asian giants. The dispute is alarming over sustained growth in water and energy demand, act of interfering with natural river flows from dams, inter-basin water transfers and water diversions. The basin is characterized by large seasonal fluctuation in water availability due to the very wet monsoon and the extremely dry winter (<http://www.saciwaters.org/brahmaputra-dialogue/index.html>). The curious amalgam of growing populations, fast economic growth, and intensified global competition for energy resources is driving both China and India to put emphasis on hydropower. The planned hydropower and water diversion projects, combined with mounting water security concerns have a greater impact on relations between these two countries.

2. POTENTIAL FACTORS FOR WATER INTERVENTION

The current problem of massive water shortages could force both India and China to "securitize" water sources and lead to tension. The idea of diverting the water of Brahmaputra was first mentioned in the International Conference of Global Infrastructure Fund in Anchorage, Alaska, in 1986. In 2005, the publication of the book "Tibet's waters will save China" brought this issue to the

limelight by (Li, 2005). Prior to this, the people's daily in 2003 reported the launch of a feasibility study on diverting the Brahmaputra (Hughes, 2013). China is not secure in water, meaning thereby uneven distribution of waters within its territory (Govt of China, 2012). For having a massive South North water diversion project, China had made an aggressive attempt by diverting the water of the river that has caused the deterioration of the harmonious relation since 1962. The unbelievable growth of Chinese population and growing urbanization has aggravated the greatest concerns of the country. The requirement of water in urban areas is projected to increase by between 65-100% over the next 20 years. China's hydro projects and water requirements are bringing the country into conflict with its neighbours. There are already rising conflicts between the water demands of agriculture, energy and cities (Addams et al., 2009). Current data show that China has only 7 per cent of world's fresh water to meet the needs of 22 per cent world's people. Again, the country's water resources are not equally spread. The increasing demands from rapid economic development and gross levels of water contamination have put further strain on the already stretched natural surface and groundwater supplies, particularly in the Northern China plain (http://news.qq.com/a/20130821/001282_all.htm).

The decreased water flow and the environmental impact together have impacted the irrigation practices and local livelihoods further compounding the intensity of the problem. The continuing melting of Himalayan glacier as a result of climate change, drying up the Brahmaputra river have palpable impact upon human health, water availability and rise in water-borne diseases. Mudslides caused by glacier avalanches are also on the rise. The greatest hazard of all comes from seismic activity. Climate change has brought about main environmental problems on the Tibetan Plateau and in the river basins: snow lines creeping higher, accelerating glacier melt (on average 200 to 500 metres retreat over the past 20 years) and widespread desertification and degradation that have turned vast swathes of the river basin into sandy dunes (Walker et al., 2014 and Yong, 2010). Ma Jun, author of the seminal book, China's Water Crisis has explained: "In some regions, the environmental capacity is very low, and the groundwater is now quite depleted. We have either to change our livelihoods, or make space for natural restoration to happen. We have to recognize that in certain parts of our earth, existence is fragile" (Jun, 2004 and Christina, 2010). Across the country, industrial waste, agricultural runoff and inadequate sewage infrastructure have rendered almost half of China's surface water unusable. The Brahmaputra flows through some of the most heavily disputed and unstable areas in South Asia. China and India currently dispute 83,000 K.M within the basin. Alluvial or "Char" land that is exposed as a river shifts often leads to dispute, as the land is highly valued for agriculture (CIA, 1998 and IBRU, 1999). Both China and India are water-stressed economies. The spread of irrigated farming and water intensive industries have led to severe struggle for more water. Both are in the era of perennial water scarcity. A large population, water shortages, ineffective water sharing and rising demands of middle class call for a stable source of water supply between two nations. Melting glaciers badly affect rivers originating in the Tibetan Plateau which leads to tension. In order to overcome hydrological unevenness, projects like the "South to North water diversion" was first proposed by chairman Mao in 1952 to reduce water shortages in the cities like Beijing & Tianjin. Later on faced with acute water shortage, China proposed for water diversion projects namely- the South-North Water Diversion Project and the Great Western Route Diversion Project. There are two components behind the planning of Yarlung projects. (i) to generate hydro Power (ii) to reroute the Brahmaputra's water to the dry yellow river in the North Western provinces of Xinjiang and Gansu.

Tibet is the second largest province of China after Xinjiang. The existing water resources in Tibet are estimated to be 40,000 times higher than in China (<http://www.tibet.net/en/pdf/diirpub/environment/4/chap-2.pdf>). Tibet is the source of major Indian rivers. It is the world's largest fresh water storehouse after the polar ice caps. The Tibetan Plateau serves as common source of water resources for upstream dams, barrages and canal (Chellaney, 2009). The Tibetan Plateau is the principal Asian watershed and source of ten major rivers. Four of the world ten rivers the Brahmaputra, Indus, Yangtze and Mekong have their head water on Tibetan Plateau. China's intensive farming requires water. Now China is emphasizing upon massive inter-basin and inter-

river water transfer projects. China wants to re-route Brahmaputra water northward before the river enters India. The Brahmaputra is also the source of freshwater for China. The increased demand of fresh water has prompted the construction of dams and barrages by way of artificial structures (Rashid, 2013). China foremost desire is to reduce its reliance on fossil fuels. To meet future demand for energy, China strives for doubling its electricity generating capacity from 960 gigawatts in 2010 to 1,900 GW in 2020. Huge hydroelectricity projects for energy & water diversion schemes for food sufficiency are strategic to China's growth path (Sinha, 2012). The high dependence on coal has also given the dubious distinction of being world's top emitter of green house gases. This factor demanded to think again on the "Scientific Development Concept" for a balanced and sustainable development. China's new energy policy then emphasized upon hydro and nuclear power.

The extraction of Tibet's untapped natural resources are supposed to fuel the economic engines of eastern China which will make backward Tibet forward, ensuring economic integration and stability. Increasing hydropower resources facilitates China to reduce the income gap between China's eastern provinces and its western regions. Selling electricity to its neighbours promotes cross border integration, which benefits the western China development programme. Apart from it, energy is most important for tapping significant reserves of uranium, borax, chromite, lithium, copper, zinc, iron etc., in the Tibet Autonomous Region (TAR).

3. HYDRO-PROJECTS AND ITS REPERCUSSIONS

Hydro projects on the Brahmaputra in China are a matter of utmost concern to lower riparian countries. Across the region, there are major plans in Pakistan, India, Nepal and Bhutan to build more than four hundred dams, with over 160,000 MW of new projects proposed over the next 20 years. If these plans are put into action, the Himalayan region will have the highest concentration of dams in the world, with far-reaching implications for the landscape, ecology and economy of the region (Walker, 2014). India is marching ahead with its own plans for damming the Brahmaputra. Around 150 mega and micro-hydel projects are being planned in the Northeast especially in Arunachal Pradesh. These dams will considerably change the volume of water flow in the Brahmaputra causing disastrous impact on the rich bio-diversity of the region (Ramachandran, 2015). The planned diversion of the Brahmaputra's waters is expected to have bad consequences for water flow, agriculture, ecology, and lives and livelihoods downstream. In the eyes of Chinese, China's dams on the Brahmaputra may be run-of-the-river projects but they are "a matter of greatest concern to lower riparian countries", argues Ramaswamy Iyer (Iyer, 2015). He points out that 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, and the break can be very long, upwards of 10 km in many cases, even 100 km in some cases; and there would be a series of such breaks in the river in the event of a cascade of projects. In such projects the turbines operate intermittently in accordance with the market 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-from 0% to 400% in a day-in downstream flows. There is one case in which the river is dry for 20 hours in the day and in the remaining four hours there is an eight metre water wall rushing down the river. No aquatic life or riparian population can cope with that order of diurnal variation (Iyer, 2015).

This diversion would cause a significant drop in the river's water level as it enters India. It will have serious implication on agriculture and fishing in the downstream areas as the salinity of water will increase. Even a 10 percent of diversion from the river could have also severe consequences for downstream areas. Analysts predict that "water wars" could break out between India and China. "Upstream dams, barrages, canals, and irrigation systems can help fashion water into a political weapon that can be wielded overtly in a war, or subtly in peacetime to signal dissatisfaction with a co-riparian state. Even denial of hydrological data in a critically important season can amount to the use of water as a political tool," warns strategic affairs expert Brahma Chellaney (Ramachandran, 2015). "Rivers unite us, but dams divide us", says Peter Bosshard, of the

International Rivers Network. The race for dam building by both China and India on the coast of Brahmaputra will cause cumulative environmental impacts beyond the limits of the river's ecosystem, and endanger the livelihoods of more than 100 million people depending on the river (BBC, 2014). Various hydrological projects of China are located in an earthquake-prone area and very close to the geological fault line where the Indian Plate collides with the Eurasian Plate. If a catastrophe takes place again like the massive earthquake in 2008, it will invite disastrous environmental consequences and large areas of Assam and Arunachal Pradesh will go under water (<http://www.newindianexpress.com/nation/China-Pushes-India-to-the-Wall-on-Brahmaputra/2015/08/08/article2964128.ece>). The hydropower dams have been built on the world's last free-flowing rivers in northeast India and southwest China paying no attention of its bearings on their lives and livelihoods of the people in the region. These projects threaten fragile ecosystems, wetlands and protected forests. The powerful effects of these projects are reflected on the livelihoods of people where these dams are being built. It unfavourably affects people who depend on the water commons for their livelihood. The hydropower dams can displace thousands of people who depend on small-scale fishing and subsistence agriculture (Baruah, 2014).

The numbers of hydro-engineering works built on the coast of the Brahmaputra are so much so that it will have negative consequences upon the people downwards. The earthquake and the floods of 1950 are indelibly imprinted in the collective memory of the people of the Brahmaputra Valley. Ever since, floods in the Brahmaputra Valley have become more frequent and destructive. Over the years, as rivers have changed course and riverbanks have eroded, thousands of acres of productive agricultural land, homes, valuable infrastructure and sometimes entire villages have been vanished in Assam. The dykes and embankments built to provide flood protection have been no match to the Brahmaputra's fury. To this day, the region struggles with the consequences of the 1950 earthquake. Floods have pushed thousands of people into new areas, and in recent years, to more and more vulnerable lands, to forestlands, protected areas, where they are often identified as encroachers. Many have been forced to give up agriculture and have moved to urban areas in search of alternative sources of livelihood (Baruah, 2012).

4. INDIAN CONCERNS

Water is the lifeline for more than one billion people living down stream. The diversion of water heavily causes environmental devastation of India's northeastern plains. North India would be starved of its lifeline. China has used water as a political weapon against India. The Chinese projects constitute an imminent threat to India's water security. The management of water through river projects was not water storage, but deadly flash floods. Nutrient-rich sediments that enrich the soil of these regions would be held back in the reservoir instead of reaching the river's delta. A water war could ensue (Arpi, 2003) China is a country which is not interested in addressing the water issue faced by India. It thinks that it is not a problem at all. It hardly considers the ecology and economic future of northeastern states of India. China's discrete water utilization and water committal approaches are equally provocative. China's thirst for water is so intense that it will leave other lower riparian states thirsty, according to analysts (Sinha, 2012).

People of Northeast were depending on its water for agriculture. Now by this project, Indian farming became vulnerable along with frequent environmental hazards. Reduction in water discharge of Brahmaputra has added to the problems of poverty, migration, violence and social instability. It could give more strategic leverage to China than India. An officially blessed book published in 2005, *Tibet's Water will save China* (2005) openly championed the northward re-routing of the Brahmaputra (Chellaney, 2009). India has been reeling under the perennial fear of China. If water is stored in the upper stream by China, there will be less water flowing, causing negative effects on water use for its industrial and agricultural sectors. In respect of control of allocations of water means, China will exert substantial economic influence upon the rising South Asian power. India contents that China will probably carryout interceptions during dry seasons and

discharges during rainy season as means to impose pressure on Indian government. India will remain at the mercy of upper riparian China.

Beijing gave no notice to the Indian Government in building the \$ 1.2 billion Zangmu dam on Brahmaputra. China always chooses to remain secretive on diversion issue. If China continues in constructing dams in the upper reaches of the Brahmaputra, it would surely affect the downstream areas in Northeast India. The depletion of water resources would cause an adverse impact in the agriculture, fishing and in total the economy of the region. If China goes building projects on Brahmaputra River, it will not only affect its neighbours, but also a regional instability in South Asia and water crisis. Lack of transparency and lack of water sharing treaties are major concerns for India. The silent water war can become a reality. China's expertise & knowledge of dam building facilitates to widen its power & influence & weakens lower riparian coalitions.

China disturbs the status quo in international water flows by way of construction of mega-dams, causing serious implications for Southwesterly neighbour. It has erected more dams than the rest of the world combined. The construction of dams is ecologically unsafe with serious and disastrous consequences (Li, 2005; Chellaney, 2011). China is the world's most prolific builders of hydropower dams and is the source of 10 major rivers flowing to 11 countries. The conflict over water resources may escalate the situation into potential intensified controversy. China is a country which adopts unilateral approach in the construction of dams without consulting other countries about how a new dam may affect them. It does not address its neighbour's concerns. The China's neighbours have water agreements among themselves, but no one has made any water treaty with China (Chellaney, 2011). China does not consult any co-riparian state before starting any geopolitical progression. It fails to understand the nuances of downstream affects on the lower riparian countries by hydro-projects on upper reaches of river. It uses water as a political tool to attain the unrivalled water hegemony in the region. India's high-levelled edginess stems from China's opaque position. China treats water as an essential strategic commodity by building engineered hydro-projects (Hukil, 2013).

China is driven by energy thirst. China is the largest industrial water consumer with 120 billion cubic meters a year. Water is becoming an aspiration for prosperity. Beijing continuous interest for establishing its leadership in water domain has exacerbated the fractious and uneasy relationship to a more potential form. China is seen as a water hegemonic power. Sharing of the trans-boundary water resources is a huge challenge to the harmonious Sino- Indian relations. The construction of dams is a calculated strategy by China to exert control over its resources at the expenses of other riparian countries. China tries to treat water for ensuring sustained economic growth, political and social stability. Unilateral Chinese harnessing of resources causes a political discord between two Asian giants and water has become a potential source of enduring discord. China does not have a single water treaty with any co-riparian country. It rejects the very concept of water sharing. It sets up water diversion structures in its borderlands, spurring unease and concern in downriver countries. China is now confronting diplomatic challenges in a region where it had worked to project an image of benevolence and brotherhood. China is always opaque in its hydro-engineering plans, refusing to share information. Water has become an apple of discord and a security issue in Sino- Indian relations. The Indians government has frequently been insisting China to share hydrological information, transparency and not to redirect the natural flow of water, but it has proved of little value (Chellaney, 2009). China plan is to acquire great power leverage over India, worsening the tension between two Asian giants (Gordon, 2009).

5. CHINESE CONCERNS

According to the Chinese, the Indians protest China in the case of building dam projects on the Brahmaputra to gain sympathy and support from the international community. The Chinese development projects do not impede the flow of river. India prevents China from developing Tibetan water resources (Zhifei, 2013). The security fears of India are exaggerated propaganda. China also wants to share its water, hydroelectricity with its neighbours. The construction of dams

are meant for downstream countries also as they will be benefitted out of it. In order to bolster its control over the disputed Arunachal Pradesh, India is building reservoirs on the Brahmaputra River. It has already set up dozens of hydro power stations to reinforce its actual control and occupation in the disputed area (Patranobis, 2013). The Chinese scholars believe that India is greedy and water from the tributary rivers on its side of Himalaya frontier should be adequate. India wants deliberately to make China a water security threat. It has been asserted that Delhi has no legitimacy to demand China's restraint as it used large volumes of water (Holslag, 2011). China sees hydropower as a key resource for responding to energy shortages which is an impediment to economic growth (Rosenfield, 2010).

There are signs of increasing desertification of Northern China. Around 500 million people living in northern region get access to only one fifth of total fresh water in China whereas Southern part gets four fifth of fresh water with a population of 700 million. To set this imbalance right, China needs to bring in sufficient water to its northern region from all possible sources (Mishra, 2010). China has assured India that it would ensure protection and rational use of water resources in the trans-Himalayan Rivers that flow to India from the upper reaches of Himalayas on the Chinese side. With an average elevation of about 4000 meters, the system will provide electricity and prove to be a useful mechanism in flood control methods. China upholds the principle of "Prior Appropriation". For China, the building of the dam is merely a run-of-the river water project aimed at generating power that will not hold the water of the lower riparian states. This hydro project "is not of a big capacity and has no need for storage of water and it will not affect the ecology and environment". The Chinese government always adheres to the principle of fairness, reasonableness and equal attention to development and protection of the interests of the lower stream regions (The Economics Times, 2012).

6. CONFIDENCE BUILDING MEASURES

In 1954, both countries signed a MoU to share hydrological data but the border war 1962 halted the progress. In 2002, A MoU was signed for five years to help in forecasting floods caused by Brahmaputra in this North Eastern India. In accordance with the provisions of MoU, the Chinese side provided hydrological information (Water level, discharge and rainfall) in respect of three stations namely Nugesha, Yangcun and Nuxia located on river Brahmaputra from the 1st June to 15th October every year through e-mail twice a day. Both nations have not shown any interest in 1992 United Nations Economic Commission for Europe (UNECE). Another MoU was signed in April 2005 for supply of water flow information in respect of Satlej in the flood season. In 2006, during Chinese president's visit to India, an agreement was made for setting up an Expert-level-Mechanism (ELM) to discuss interaction and co-operation on the provision of flood season hydrological data, emergency management and other related issues (Raul, 2013). According to recent MoU (2013) both will exchange views on issues of mutual interest. The main concern for India is not only the Yarlung project in Brahmaputra water, rather the China's effort of diverting the water to its arid Northern areas. In October, 2013, Prime Ministers of both countries agreed to strengthen their co-operation on the trans-border Rivers through the existing Expert level Mechanism to provide flood season data and emergency management. Under the new agreement, the Chinese side agreed to provide more flood data of Brahmaputra River from May to October instead of June to October that was in practice beforehand.

7. NEED OF THE HOUR

Both China and India have been plagued by drought and shortage of drinkable water. The water shortages in two countries present a large threat to food security. Both leaders of two nations seem to recognize these new challenges. Both need to develop water sharing agreement. China, India and Bangladesh should design a comprehensive river basin plan to control geological disasters and

impact of the hydroelectric projects. The impact of ecosystem tipping points is also highly devastating beyond our current knowledge. Keeping this thing in view, adaption strategies and adaption action plans need to be undertaken collectively. An integrated dialogue is called for managing & reducing disaster along with the use of technology & resources. The security forces of both countries should be deployed in the border areas for the early reporting of any serious ecological changes found in the region. There is a greater necessity for undertaking collaborative scientific studies on glacier melting & its effects on the flow of river (Gautam, 2012).

There is a necessity to redefine Tibetan water sources as a 'commons' that would draw international attention & encourage China to get into a water dialogue with downstream countries. India needs to put forward a strong case to China, based on the ecological, cultural and livelihood sustenance, the river provides the lacs of people down-stream (IDSA, 2010). It is equally important for India to frame policies that are not reactive but perceptive. India should leave no stone unturned to draw China into a water dialogue diplomatically (Sinha, 2012). There is a need to set up mutual scientific and technological partnerships to optimize water efficiency, environmental protection and conservation strategies. As the international laws are weak in the governance of water, the best way for India to manage hydro-politics with China is through co-operative approach and institutional mechanism. Utilizing water resources in collaboration with neighbours may indeed promote win-win solutions. A joint hydroelectric dam can be shared benefits to all lower riparian states and upper riparian states. Cooperation can be driven by benefits from the river and to the river through joint multipurpose projects, improving the management of water resources, monitoring changes in glaciers, coping with floods and strengthening natural disaster management. Emphasizing options for co-operation at various levels may broaden the basket of potential benefits to both upstream and downstream countries (Svensson, 2012).

To moderate competition and build value-based co-operation, institutional mechanisms are most essential at bilateral or basin-wide level as there is no international treaty presently in effect. There are no practical enforcement mechanisms internationally available to prevent any country from materially altering cross border flows of a transnational water course through dam building. That is why it is important to build co-operation on the basis of jointly agreed rules. Inter country water institutions based on the international norms of fair utilization would help in facilitating constructing dialogue and structured co-operation. Although such co-operation is a daunting task, still such collaboration is necessary for maintaining the sustainability of basin resources, strategic stability and environmental protection (Chellaney, 2012). Such co-operation needs to be based on transparency, information sharing, dispute settlement mechanisms and a mutual commitment to refrain from projects diminishing water flows. There is need of a treaty on the Brahmaputra, but it cannot be a bilateral one between India and China; it will have to be a multilateral one covering China, India, Bhutan and Bangladesh, with a multilateral Brahmaputra Commission similar to the Mekong Commission. A joint India–Bangladesh approach to China on this matter would be far more effective than separate approaches (Iyer, 2015). Preserving rivers and ecosystems that support low energy-intensive livelihoods of rural populations, and help those livelihoods more sustainable, could be a better alternative for building hydropower dams. Such an approach to rivers is unlikely to cause any harm to co-riparians, a major principle of modern transboundary water laws (Baruah, 2014).

8. CONCLUSION

Water conflict is a Sword of Damocles hanging over the heads of Asian giants. Something has to be done before the catastrophe of conflict clasps the beautiful creation. Efforts should be continued to douse the conflict before it takes intense form. The importance of transparency is a guiding principle for both nations that can save time without wasting on reassurance and crisis management. It is right time to devote efforts for developing goodwill and relations needed to set up joint scientific research projects in the Himalayan region, and more extensive hydro-data and information sharing norms (Tenzin, 2015). Water should become a source of co-operation, not of conflict. It is

time to have a water treaty between Asian giants based on sharing of information, thought, mutual understanding that will dispel the suspicion and develop trust and entente between the two countries. Diplomatic channels and bilateral arrangements will serve the purpose in the due course. In case, the negotiations for amicable settlement falls flat, the issue should be raised at UN Security Council as the lives of millions of people are in danger. The 2010 SFG report had suggested for the formation of a Himalayan Rivers Commission to create a peaceful and multilateral approach to tackling overall water shortage. But India, China and their neighbours are yet to agree on a coordinated approach so far. There is neither bilateral agreement on water sharing nor any supervening international law to regulate such activity. In this situation, both nations are required to discuss the issue in order to reach a satisfactory agreement. The need for consultation and accord on specific projects has become more important on water sharing.

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REFERENCES

- Addams, L., Boccaletti, G., Kerlin, M., Stuchtey, M., 2009. Charting our water future 2030 Water Advisory Group. The World Bank, Washington, DC (http://www.2030waterresourcesgroup.com/water_full/Charting_Our_Water_Future_Final.pdf).
- Arpi, C., 2003. Diverting the Brahmaputra: A Declaration of War. 23rd October, <http://www.rediff.com/news/2003/oct/27spec.htm>
- Baruah, S., 2014. Upstream superpowers. The Indian Express, December 5.
- Baruah, S., 2012. Whose River Is It Anyway? Political Economy of Hydropower in the Eastern Himalayas. *Economic & Political Weekly*, July 21, 47(29): 41-52.
- BBC, 2014. Megadams: Battle on the Brahmaputra. 20th March, British Broadcasting Corporation (BBC), (BBC news <http://www.bbc.com/news/world-asia-india-26663820>, accessed on 11th October 2015).
- Chellaney, B., 2009. Coming water wars. *International Economy*, Fall, The Magazine of International Economic Policy, Washington, D.C.
- Chellaney, B., 2011. Water: Asia's New Battle Ground. September 2011, Georgetown University Press, Washington, D.C.
- Chellaney, B., 2012. From Arms Racing to Dam Racing in Asia: How to Contain the Geopolitical Risks of the Dam-Building Competition. *Transatlantic Academy Paper Series*, NW Washington, DC, May.
- CIA-Central Intelligence Agency. 1998. The CIA World Fact book. United States Central Intelligence.
- Gautam, P.K., 2012. Climate changes & conflict in South Asia. *Strategic Analysis*, 36(1): 32-40.
- Gordon, S., 2009. Sino Indian Relations & the rise of China. Ron Huisken (eds) 2009. *Rising China: Power & Reassurance*, ANU press, The Australian National University, Canberra ACT 0200, Australia.
- Govt. of China, 2012. http://www.mwr.gov.cn/slxz/slyw/201202/t20120216_314015.html, Ministry of Water Resources, (Retrieved Nov. 11, 2013).
- Hughes, L., 2013. China Plans for Yarlung Tsangpo River cause India concerns. *Future Direction International Strategic Weekly Analysis*, 6th Feb., 4(2).
- Holslag, J., 2011. Assessing the Sino-Indian Water Dispute. *Journal of International Affairs*, Spring/Summer, 64(2): 19. <http://www.saciwaters.org/brahmaputra-dialogue/index.html>, accessed on 24th January 2014
- http://news.qq.com/a/20130821/001282_all.htm, accessed on 18th November 2013

- <http://www.tibet.net/en/pdf/diirpub/environment/4/chap-2.pdf>, accessed on 15th December 2013
- <http://www.newindianexpress.com/nation/China-Pushes-India-to-the-Wall-on-Brahmaputra/2015/08/08/article2964128.ece>, accessed on 25th October 2015.
- <http://www.newindianexpress.com/nation/China-Pushes-India-to-the-Wall-on-Brahmaputra/2015/08/08/article2964128.ece>, accessed on 27th September 2015.
- Hukil, R., 2013. India, China and the Brahmaputra: Understanding the Hydro-politics. Inside China-IPCS China Research Programme Quarterly, July-Sept, 3(3).
- IBRU - International Boundary Resource Unit, 1999. International Boundaries Database. University of Durham, England
- IDSAs - Institute of Defence Studies and Analysis, 2010. Water Security For India, The External Dynamics Task. IDSA Task Force Report, September, New Delhi, p. 46.
- Iyer, R.R., 2015. India-China-Brahmaputra, Suggestions for an Approach. Economic & Political Weekly, February 28, 50(9): 13-15.
- Jun, M., 2004. China's Water Crisis: Voices of Asia. East Bridge.
- Larson, C., 2010. Growing Shortages of Water Threaten China's Development. Yale Environment (http://e360.yale.edu/feature/growing_shortages_of_water_threaten_chinas_development/2298/), accessed on 14th November 2013).
- Li, L., 2005. Xizang Zhi Shui Ziu Zhongguo: Xi Xian Zai Zao Zhongguo Zhan Lue Nei Mu Xiang Lu (Tibet's Waters Will Save China), in Mandarin (Beijing: Zhongguochang'an chu ban she, 2005).
- Mishra, B.K., 2010. Chinese eyes on Brahmaputra waters. Look East, September.
- Patranobis, S., 2013. India making up claims on water issue to gain sympathy: China, Hindustan Times, Beijing, October 8th.
- Ramachandran, S., 2015. Water Wars: China, India and the Great Dam Rush. The diplomat, April 3.
- Ramachandran, S., 2015. Tripartite treaty needed on sharing Brahmaputra's waters in Asia. Asia Times, October 19 (<http://atimes.com/2015/10/tripartite-treaty-needed-on-sharing-brahmaputras-waters/>), accessed on 19th November 2015).
- Rashid, B.H., 2013. Proposed diversion of Brahmaputra River by China. Former Bangladesh Ambassador to UN, Geneva (http://www.sydneybashi bangla.com/Articles/Harun_Diversion%20of%20Brahmaputra%20River%20by%20China.pdf).
- Raul, A., 2013. India-China Hydro Diplomacy: Beyond Information Sharing MoUs. Opinion/Analysis, The Society for the Study of Peace and Conflict (SSPC), March 12, New Delhi.
- Rosenfield, J.M., 2010. Exploring the India China Relationship, Round Table Report. CNA China studies, Analysis and solution, MISC D0023594, A1/Final, September.
- Sinha, U.K., 2012. Examining China's Hydro-Behaviour: Peaceful or Assertive? Strategic Analysis, 36(1): 41-56.
- Svensson, J., 2012. Managing the Rise of Hydro-hegemon in Asia: China's strategic interests in the Yarlung-Tsangpo river. IDSA occasional paper, No. 23, Institute of Defence Studies and Analysis, New Delhi.
- Tenzin, P., 2015. China, India and Water across the Himalayas. The National Interest, July 29.
- The Economics Times, 2012. China claims Brahmaputra dam not affecting water flow to India. The Economics Times, March 2.
- Walker, B., Isabel H., Chen H., Huang Y., Yunnan C., 2014. China's water security crisis. February, Europe China Research and Advice Network (ECRAN).
- Yong, Y., 2010. Presentation in 2010 by chief scientist at the Hengduan Institute of Mountain Hazards, Chengdu (<https://www.chinadialogue.net/article/show/single/en/4604-Saving-south-Asia-s-water>), accessed on 19th October 2015)
- Zhifei, L., 2013. Indian threat-mongering over water resource disputes dangerous fantasy. Global Times, 7th October (<http://www.globaltimes.cn/content/815960.shtml#Uum-xvmxhw>), accessed on 19th November 2014).