

# Water Crises, Water Disputes and Water Cooperation: New Perspectives for Sino-Indian Relations

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Both China and India are suffering from a set of grave water crises involving water scarcity, imbalance in both space and time, low water use efficiency and rampant water pollution. Sino-Indian relations might suffer due to a ‘concern’ over the so-called ‘diversion of the Yarlung Zangbo’ and water resource development in Tibet. However, the two neighbours need to cultivate sincere water cooperation covering joint research in hydro-technology and water policy, business-to-business engagement and international cooperation on water issues. This will effectively help address the water challenges of both countries.

The paper aims to outline the major water security challenges inside both China and India as well as potential conflict over water between them on the one hand, and to explore possible water cooperation between the two neighbours on the other. The major hypothesis is that domestic water security challenges for both China and India are real and severe, while the so-called water conflict between them is largely a played-up story. In this sense, the paper rejects the zero-sum realist framework and calls for a non-zero-sum liberalist approach for a better understanding of the water dynamics between China and India.

*Keywords:* water security, water dispute, water cooperation, Sino-Indian relations.

As a most precious source of life, water is developing into an acute security challenge for many countries around the world in general and countries with big populations like China and India in particular. As rising powers, both countries are currently facing grave and similar water security challenges. Sincere cooperation between the two neighbours would help tackle these challenges and, more importantly, encourage the smooth development of Sino-Indian relations. The potential water ‘conflict’, on the other hand, might have very negative impact on Sino-Indian relations. Joint effort to resolve differences on the one hand and to develop cooperation on the other will help the sustainable development of the two Asian giants and improve relations between them. Based on data collected in the United Nations Food and Agriculture Organization

(UNFAO) Aquastat database on water resources around the world, *Communiqués on Water Resources in China* issued by China's Ministry of Water Resources in recent years and other sources, this paper attempts to carry out a tentative survey of water security as a challenge to both China and India, in addition to discussing their potential differences and cooperation on water.

## Introduction and Background

A theoretical framework on water security is not quite readily available. However, general IR theories can shed some light in this regard, as water security is anyhow a major security issue, even if not a traditional one. Political realism, as a pessimistic approach to international security, holds that international security is difficult to maintain as no international player can trust others.<sup>1</sup> A self-claimed non-aggressive self-defence effort on the part of A will probably be interpreted as a threat to B. Self-claimed countermeasures on the part of B will in turn be deemed a threat to A. The uncertainty of intention and the interchangeability of defensive and offensive power create a vicious circle known as the security dilemma, from which no one can escape. Security in this sense is regarded as a zero-sum game because one party's gain automatically translates into another party's loss.<sup>2</sup> In other words, an increase of security for one party is roughly equal to an increase of insecurity for another party. In such a situation, cooperation becomes unlikely if not outright impossible. The security dilemma discourse also prevails in discussions on the issue of water security.<sup>3</sup> One of the reasons behind this is that like any other resource, water is limited. If one uses a particular volume of water, the same volume will no longer be available to another user. The diversion of a river will offer the upper riparian better opportunities of fuller use of the water resources and therefore potentially reduce the share of other players. Needless to say,

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<sup>1</sup> Robert Jervis, 'Cooperation Under the Security Dilemma', *World Politics*, Vol. 30, No. 2 (January 1978), pp. 167–214.

<sup>2</sup> John H. Herz, 'Idealist Internationalism and the Security Dilemma', *World Politics*, Vol. 2, No. 2 (January 1950), pp. 157–180; Robert Jervis, 'Cooperation Under the Security Dilemma', *World Politics*, Vol. 30, No. 2 (January 1978), pp. 167–214. See also Chinese authors who are in favour of the concept of the security dilemma, like Shen Dingli, 'Nuclear Proliferation and International Security', *The Journal of World Economy and Politics*, Vol. 2, 2008; Yan Xuetong, *International Politics and China*, Beijing: Peking University Press, 2005.

<sup>3</sup> One can easily find a number of research studies in this regard, such as those focusing on water relations between India and Pakistan, India and Nepal, Egypt and Sudan, Turkey and its neighbours, India and Bangladesh, the US and Mexico and China and India. For the China–India water dynamics, see Zeng Xiangyu, *Non-Conventional Security and Sustainable Development: A Study on Water and Energy Security in India*, Beijing: Current Affairs Press, 2017; Li Zhifei, 'Climate Change and Water Security in China's Periphery', *The Journal of International Studies*, Vol. 4, 2015; 'Analysis on Water Resource Security Relations in China's Periphery', *Journal of International Security Studies*, Vol. 3, 2015; 'The Water Resources Security in Sino–India Territory Dispute', *South Asian Studies Quarterly*, Vol. 4, 2013.

such a scenario is in fact inherently similar to a zero-sum game where the gain of one side is the loss of another.<sup>4</sup>

However, this might be an over-simplification of a much more complicated issue. The security dilemma is unlikely when it comes to many of the domestic mitigation measures such as water-saving, increase of water use efficiency, pollution control, etc. In fact, many of these measures are going to have positive implications for other countries. A security spill-over is possible when major hydro-development is made along international rivers; however, shared benefit can also be generated in terms of flood control, increasing water supply in dry seasons, pollution reduction in lower riparian zones and sharing hydro-power as generated by power plants located in the upper riparian areas.<sup>5</sup> That is to say, a non-zero-sum game of win-win can be a realistically feasible option with regard to water security issues. This seems to lead us to Neo-Liberal IR theory which attaches great importance to institutions and the non-zero-sum game. Without restating the Hobbesian, Lockean and Kantian approaches<sup>6</sup> as developed by constructivism, this article believes that water insecurity between states can be interpreted from perspectives other than the Hobbesian and that therefore there is an urgent need to move beyond the scarcity-conflict paradigm associated with the Hobbesian approach.<sup>7</sup> This paper is going to make an effort to show how China and India can go beyond the said paradigm and how they could cooperate with each other, even tentatively, to encourage a Lockean perspective on water security issues.<sup>8</sup>

There is abundant research on the water issue between China and India. Books devoted solely to the issue are hardly available, but major works with a strong relevance to China-India dynamics usually address the topic. The Institute for Defense Studies and Analyses (IDSA), a major water security research centre in India, has produced two books and a number of papers and commentaries. *Water Security for India: The External Dynamics* (IDSA Task Force, New Delhi: Institute of Defence and Analysis, September 2010) devotes one chapter (Chapter 3) to the China-India water issue, while Chapter 1 ('Water Security in the Indian Context') and Chapter 7 (Recommendations) also have a strong relevance to China. *Riverine Neighbourhood: Hydro-politics in South Asia* (Uttam Kumar Sinha, New Delhi: Pentagon Press, 2016) follows a similar approach,

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<sup>4</sup> Robert Jervis, 'Cooperation Under the Security Dilemma', *World Politics*, Vol. 30, No. 2 (January 1978), pp. 167–214.

<sup>5</sup> Wang Zhijian, *International Law on River*, Law Press China, 2012; Wang Zhijian, *Water Hegemony, Security Order and Mechanism Building*, Social Sciences Academic Press (China), 2015.

<sup>6</sup> Alexander Wendt, *Social Theory of International Politics*, Cambridge University Press, 1999, pp. 246–312.

<sup>7</sup> Drawing on the 2003 UNESCO World Water Assessment Programme study, Yang Xiaoping in 'Go Beyond the "Scarcity-Conflict" Paradigm: Transboundary Water Resource Issue between China and India' (*International Forum*, No. 4, 2012) claimed that the apparently logical 'scarcity-conflict' paradigm in fact can hardly be substantiated by empirical evidence.

<sup>8</sup> Alexander Wendt, *Social Theory of International Politics*, Cambridge University Press, 1999, pp. 246–312.

dealing almost exclusively with external dynamics. The Centre for Policy Research (CPR) is another major research centre focusing on this issue. Brahma Chellaney from the CPR is an active analyst. His bestseller *Water: Asia's New Battleground* (Georgetown University Press, 2011) devoted a chapter to 'The Tibetan Plateau: The World's Most Unique Water Repository' in addition to more discussion on the China-India equation in this regard. In China, one can find at least four books on the subject. *Water in China's Engagement with Neighboring Countries* (Li Zhifei, Beijing: Current Affairs Press, October 2015) and *Non-Conventional Security and Sustainable Development: A Study on Water and Energy Security in India* (Zeng Xiangyu, Beijing: Current Affairs Press, January 2017) are both devoted in major part to water security issues between the two neighbours. The relevance of *International Law on River* (Li Zhifei, Law Press China, June 2012) and *Water Hegemony, Security Order and Mechanism Building* (Li Zhifei, Social Sciences Academic Press [China], January 2015) is more tacit and indirect, as the two books are more theory-oriented. Moreover, a large number of academic papers have been published in major journals in both countries, including in *Strategic Analysis*, *International Studies*, *South Asian Studies Quarterly*, *Peace and Development* and *South Asian Studies*.

A brief analysis of the available research works highlights the following points. Firstly, the available studies, whether from China or India, largely focus on trans-boundary rivers. Compared with the international dimension, the domestic dimension of water security receives little attention among analysts with an interest in the China-India water dynamics.<sup>9</sup> This is not unique to the China-India dynamics, as one can easily find the same approach when it comes to the India-Pakistan, India-Bangladesh and even India-Nepal engagement over water. Researchers might find this somewhat surprising, as non-conventional security is generally regarded first and foremost as human security rather than state security. In other words, conventionalisation is a very notable feature of academic discourse relevant to water security issues, especially those between China and India.

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<sup>9</sup> For example, IDSA, a top strategic and defence think tank in India, produced two major research publications on water issues in recent years. *Water Security for India: The External Dynamics* (IDSA Task Force, New Delhi: Institute of Defense and Analysis, September 2010) in its seven chapters attempted to incorporate almost every land neighbour into the discussion of India's water security. The domestic dimension of this issue appeared just in the first chapter (*Water Security in the Indian Context*). *Riverine Neighbourhood: Hydro-politics in South Asia* (Uttam Kumar Sinha, New Delhi: Pentagon Press, 2016) followed a similar approach, dealing almost exclusively with external dynamics. Li Zhifei in *Water in China's Engagement with Neighboring Countries* (Beijing: Current Affairs Press, October, 2015), Wang Zhijian in *International Law on River* (Law Press China, June 2012) and *Water Hegemony, Security Order and Mechanism Building* (Social Sciences Academic Press [China], January 2015) all focused on the international rather than the domestic dimension. Major researchers on the China-India water issue such as Uttam Kumar Sinha and Lan Jianxue, all have a strong preference for the international dimension as exemplified by 'Examining China's Hydro-Behaviour: Peaceful or Assertive?' (*Strategic Analysis*, No. 1, 2012), 'Water Resource: Implications to Sino-Indian Relations' (*South Asian Studies*, No. 2, 2008) and 'Security of Water Resource: Relevance to Sino-Indian Engagement' (*International Studies*, No. 6, 2009), etc.

Secondly, mistrust and suspicion of China is a popular discourse in most of the research from India. For example *Water Security for India: The External Dynamics* and *Riverine Neighbourhood: Hydro-politics in South Asia*, both major publications of the IDSA, a top Indian strategic and defence think tank, offer a very critical view of water development programs in China. The authors recommend a set of IR realism-based countermeasures, such as early development of water resources in down streams to establish user's rights, pressuring China into compromise, etc. In *Water: Asia's New Battleground* (Georgetown University Press, 2011) Brahma Chellaney makes predictions regarding future water wars between China and India based on his evaluation of water as the next battleground in Asia, a continent suffering from water scarcity and water conflict. This China-India focus is best illustrated by the book cover, which portrays PLA soldiers (or armed police personnel) in the upper part and two Indians on a river bank at the bottom. As the 2012 winner of the prestigious Bernard Schwartz Book Award, Chellaney's book had a wide readership in the West and in India. The book, however, did not receive much attention in China and is regarded as exaggerated, although researchers are by no means unfamiliar with the author's claims. In 'Examining China's Hydro-Behaviour: Peaceful or Assertive?' (*Strategic Analysis*, No. 1, 2012) China is criticised as 'assertive' in terms of water resource development along transboundary rivers. P. K. Gautam takes a somewhat different approach in 'Sino-Indian Water Issues' (*Strategic Analysis*, No. 6, 2008), calling for Beijing's transparency and willingness to allay India's fears as a major step to motivate India to share Himalayan river data with Nepal, Pakistan and Bangladesh and to move positively towards a South Asian water information grid. However, it seems that India's sharing of river data with Nepal, Pakistan and Bangladesh remains ineffective even though hydro-data exchange and a disaster pre-warning mechanism have been in place between China and India for years.

Thirdly, research from the Chinese side is somewhat different, as it is a mixture of both mistrust and calls for cooperation. Although most research also nurtures mistrust toward India, research on cooperation exists, too. However, much of the discourse on cooperation does not in principle go beyond calls to action. Lan Jianxue from the China Institute of International Studies pioneered studies on Chinese-Indian water security in the late 2000s. In 'Water Resource: Implications to Sino-Indian Relations' (*South Asian Studies*, No. 2, 2008), he opined that water sharing along transboundary rivers, forestry protection along upper reaches and the exchange and sharing of hydro-data between upper and lower reaches constitute major elements of Sino-Indian engagement over water security, while a balance between 'absolute sovereign rights' and 'fair and just utilization' of water is much needed as well. The same author in 'Security of Water Resource: Relevance to Sino-Indian Engagement' (*International Studies*, No. 6, 2009) pointed out the significance of water resources to economic and social development. According to Lan Jianxue, the water issue is a double-edged sword which can lead to either intensified conflict or enhanced bilateral trust. In 'Water as a Factor in China-India Border Issue: A Perspective from India's Water Policy' (*Water Resource*

*Development Studies*, No. 3, 2010) Li Xiangyun observed that India attaches great importance to water development in the eastern part of the territory disputed between China and India in terms of both hydro-power potential and water resources *per se*. A trilateral cooperation mechanism was suggested by the author. In ‘Water Resource and Regional Security in South Asia’ (*South Asian Studies*, No. 2, 2010), ‘Water Resource Security and Indo-Pakistani Relations’ (*South Asian Studies Quarterly*, No. 4, 2010) and ‘Water Resource Dispute between India and Pakistan: A Retrospect’ (*Peace and Development*, No. 2, 2011) Liu Siwei from Sichuan University pointed out that settling the dispute over transboundary water is an urgent task for South Asia as water sharing treaties in the region have failed to resolve problems in a satisfactory manner. She also highlighted the Indus water dispute between India and Pakistan and recommended an Indus-Water-Treaty-based comprehensive dialogue in addition to a cooperation mechanism for a fair and sustainable settlement. In *Water in China’s Engagement with Neighboring Countries* (Beijing: Current Affairs Press, October 2015) Li Zhifei presented a comprehensive introduction to the potential water dispute between China and India and recommended institutional cooperation. In *Non-Conventional Security and Sustainable Development: A Study on Water and Energy Security in India* (Beijing: Current Affairs Press, January 2017) Zeng Xiangyu observed that the water dispute between China and India was a played-up story while the water security challenges inside the two countries were in fact severe.

Fourthly, IR realism is unfortunately the dominant discourse in both China and India, but a more liberalist approach can be discovered as well. In *International Law on River* (Law Press China, June 2012) and *Water Hegemony, Security Order and Mechanism Building* (Social Sciences Academic Press [China], January 2015) Wang Zhijian strongly recommended a river-water-contribution-based water right paradigm as a precondition for fair and sustained water sharing while discarding the commonly practised water-as-the-commons paradigm. In *Non-Conventional Security and Sustainable Development: A Study on Water and Energy Security in India* (Beijing: Current Affairs Press, January 2017) Zeng Xiangyu disagreed with the dispute discourse and recommended comprehensive cooperation between China and India, calling on them to go beyond the transboundary river paradigm. The same author in ‘Water Security in China and India: Exploring Water Cooperation’ (*Annual Report on the Development of South Asia: 2014–2015*, Current Affairs Press, November 2015) recommended Sino-Indian cooperation to find effective answers to the water security challenges of both countries. In ‘Go Beyond the “Scarcity-Conflict” Paradigm: Transboundary Water Resource Issue between China and India’ (*International Forum*, No. 4, 2012) Yang Xiaoping pointed out that the ‘scarcity-conflict’ paradigm, although logical, has largely been disproven by a 2003 UNESCO World Water Assessment Programme study. The author therefore suggests functional cooperation between the two neighbours and expects a positive spill-over to enhance strategic trust.

## Water Crises: Common Threats to China and India

Water security problems, comprising low water resource volume per capita, uneven distribution in space and time, low water use efficiency, rampant water pollution, etc., pose a grave challenge to both China and India. The challenges are further worsened by rapid population growth, serious mismanagement, frequent water disputes and climate change. The similarity is obvious when it comes to the water challenges of both countries, although it seems that the challenge in India at present is more grave than in China.

### Water Scarcity

Water scarcity is China's and India's main water challenge. India in fact enjoys very rich water resources thanks to its average annual rainfall of 1170 mm which generates 3846 billion cubic meters (BCM) of water inside its territory every year. However, only 1911 BCM of the total renewable water resources of the above volume are available each year due to various technical reasons. This is further diluted by India's huge population of 1.2 billion into some 1582 m<sup>3</sup> per capita in 2009.<sup>10</sup> The figure is expected to further decline to an alarming 1335 m<sup>3</sup> in 2025, and possibly to 1140 m<sup>3</sup> in 2050.<sup>11</sup> However, other sources indicate an even more rapidly worsening situation, as according to World Bank and FAO figures, per capita water resources have dropped to some 1118 m<sup>3</sup> in 2014, roughly 1/3 of what they were in 1962.<sup>12</sup>

The case of China is somewhat similar to that of India. China also enjoys very rich water resources (3246.64 BCM in 2016),<sup>13</sup> ranking fifth globally after Brazil, Russia, Canada and Indonesia. However, this turns into a very gloomy picture when we consider the per capita water figure of 2348 m<sup>3</sup> in the same year. This is expected to decline to 1890 m<sup>3</sup> due to an expanded population of 1.5 billion by 2033. In fact, China ranked 121st of 153 countries worldwide in terms of per capita water resources in 2006.<sup>14</sup> The Chinese have four water shortage categories comprising resource-related, infrastructure-related, quality-related and management-related scarcities. Scarcity can occur if local

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<sup>10</sup> *Irrigation in Southern and Eastern Asia in Figures-India*, Aquastat Survey, 2011, p. 5, available at: <http://www.fao.org/nr/water/aquastat/main/index.stm>. The source made a clear statement that its acceptance of Indian statistics, including territory area, is out of technical necessity and therefore cannot be interpreted as acceptance of Indian claims in this regard.

<sup>11</sup> Wilson John, 'Water Security in South Asia: Issues and Policy Recommendations', ORF Issue Brief, No. 26, February 2011; Prasenjit Chowdhury, 'Mismanagement of Water Resources', *Deccan Herald*, 18 April 2014; *Irrigation in Southern and Eastern Asia in Figures-India*, Aquastat Survey, 2011, p. 16.

<sup>12</sup> Renewable internal freshwater resources per capita (cubic meters), available at: [https://data.worldbank.org/indicator/ER.H2O.INTR.PC?name\\_desc=false](https://data.worldbank.org/indicator/ER.H2O.INTR.PC?name_desc=false).

<sup>13</sup> *Communiqué on Water Resource in China 2016*, p. 1, Chinese Ministry of Water Resources, 11 July 2017, available at: [http://www.mwr.gov.cn/sj/tjgb/szygb/201707/t20170711\\_955305.html](http://www.mwr.gov.cn/sj/tjgb/szygb/201707/t20170711_955305.html).

<sup>14</sup> *Irrigation in Southern and Eastern Asia in Figures-China*, Aquastat Survey, 2011, p. 10, available at <http://www.fao.org/nr/water/aquastat/main/index.stm>.

water resources are insufficient, if the hydro-infrastructure is insufficient or ineffective, if water quality drops to substandard or unusable, and if water management is poor and low-efficiency becomes rampant. The bad news from this conceptualization is that water scarcity can result from a number of factors other than resource shortage as such. The encouraging implications of the above categorization are that most challenges can effectively be checked by man, since water pollution, hydro-infrastructure and water management are in fact human activities that can be improved.

### **Uneven Spatial/Temporal Distribution**

Many facts are hidden in nationwide average figures, most prominently a grave unevenness in spatial and temporal water distribution. This applies to both India and China. India's water resources basically come from the Himalayan glacier and snowmelt in the north and monsoon rainfall nationwide. Thanks to glaciers and snowmelt, rivers originating in the Himalayas are generally perennial rivers of gigantic water volume. Fluctuation of water volume, on the other hand, is obvious for rivers on the Deccan Plateau. The volume goes up and down almost exactly in accordance with the yearly monsoon pattern.

In China, a South-North cut in the spatial distribution of water resources is evident as well. As a victim of grave water scarcity (462 m<sup>3</sup> per capita, or 21% of the national average), the Huang-Huai-Hai region on the North China plain has to make full use of its small share of available freshwater (7.2% of all the water resources in China) to support a population of 440 million (35% of the national figure) and to produce 35% of the national GDP.<sup>15</sup> Over-development along many if not most of the rivers in Northern China has resulted in unsustainability and degeneration of water resources and ecological systems in general. A very alarming indicator in this regard is the repeated flow cutoff on the Yellow River, the mother river of Chinese civilization and life line for a large area of Northern China. With an annual flow of 74.4 BCM in recent years, the Yellow River suffered its first flow cutoff in 1972: 278 km of its river bed in the lowest riparian zone was completely dried-up during a period of 19 days. The problem of intermittent flow cutoff in the 1970s and early 1980s became even worse after 1987, as flow cutoff became an annual regularity in the lower riparian zone and an occasional happening on some of the tributaries in middle riparian. 1997 and 1998 witnessed the worst river cutoff, as 704 km or 90% of the Yellow River's lower riparian area was completely dry for 226 days in 1997, and for 142 days in 1998.

Temporal unevenness is equally prominent in both India and China. The monsoon in India regularly comes around June and July, producing about 50% of the country's

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<sup>15</sup> 'Mr. Hu Siyi, Deputy Minister for Water Resources, Interprets the "State Council's Decree on Practicing a Most Strident Water Resource Regulation System"', 6 April 2012, available at: [http://www.mwr.gov.cn/zwzc/zcfg/jd/201204/t20120416\\_318845.html](http://www.mwr.gov.cn/zwzc/zcfg/jd/201204/t20120416_318845.html).

rainfall within two weeks<sup>16</sup> and frequent floods during the monsoon season. In China, most of the rainfall is also concentrated in the summer rain season. Floods can result sometimes, especially in South China. However, a severe shortage of rainfall and thereby drought is not rare in the spring and winter.

### Water Wastage/Low Efficiency

India is victimized by its very low water use efficiency and rampant wastage. The situation is even graver when it comes to irrigation water. In 2010, India used 688 BCM of water (91% of its water consumption) for irrigation.<sup>17</sup> Irrigation efficiency as low as 35–40% (38–40% for surface water and even worse for ground water)<sup>18</sup> is a major reason behind this. In addition, Indian agriculture is very dependent on water-consuming plantations such as rice and wheat (60% of the country's total cultivated area),<sup>19</sup> while water consumption for rice is 24,000 m<sup>3</sup>/acre, which is 6 times, 10 times and 20 times higher than for maize, beans and peanuts respectively.<sup>20</sup> Low efficiency and wastage in terms of domestic water consumption is equally serious, as best exemplified by the water loss rate of 40% in New Delhi<sup>21</sup> and 40–50% in Mumbai due to stealing, seepage and pipeline damage.<sup>22</sup>

Rampant water wastage or low water use efficiency constitutes a major challenge in China as well. For example, water consumption for every 10,000 RMB Yuan of industrial value added in 2010 was a soaring 120 m<sup>3</sup>, three or four times that of well-to-do water-saving economies. Wastage in agriculture is more acute, as 65% of all water is consumed in agriculture with a very low irrigation efficiency of just 0.50, lagging far behind the 0.7–0.8 in advanced economies.<sup>23</sup> China succeeded in raising this to 0.523 by 2013<sup>24</sup> and to 0.542 by 2016.<sup>25</sup> The government target is to reach 0.53 in 2015,

<sup>16</sup> World Bank, *India's Water Economy: Bracing for a Turbulent Future*, Washington, DC: World Bank, 2005, p. 1, available at: <http://documents.worldbank.org/curated/en/2005/12/6552362/india-indias-water-economy-bracing-turbulent-future>.

<sup>17</sup> *Irrigation in Southern and Eastern Asia in Figures-India*, Aquastat Survey, 2011, p. 3.

<sup>18</sup> *Water Stewardship for Industries: The Need for a Paradigm Shift in India*, World Wildlife Fund, 2013, p. 23.

<sup>19</sup> *Irrigation in Southern and Eastern Asia in Figures-India*, Aquastat Survey, 2011, pp. 9–11, 14, 17. The cultivation area for rice and wheat is deductible from the charts on p. 10.

<sup>20</sup> Inderjeet Singh, 'Ecological Implications of the Green Revolution', *Seminar*, No. 626, October 2011, p. 41.

<sup>21</sup> Rumi Aijaz, 'Water Crisis in Delhi', *Seminar*, No. 626, October 2011, p. 44.

<sup>22</sup> Wilson John, 'Water Security in South Asia: Issues and Policy Recommendations', ORF Issue Brief, No. 26, February 2011, p. 4.

<sup>23</sup> 'Mr. Hu Siyi, Deputy Minister for Water Resources, Interprets the "State Council's Decree on Practicing a Most Strident Water Resource Regulation System"', 6 April 2012, available at: [http://www.mwr.gov.cn/zwzc/zcfg/jd/201204/t20120416\\_318845.html](http://www.mwr.gov.cn/zwzc/zcfg/jd/201204/t20120416_318845.html).

<sup>24</sup> *Communiqué on Water Resources in China 2013*, p. 6, Chinese Ministry of Water Resources, 20 November 2014, available at: [http://www.mwr.gov.cn/zwzc/hygb/szygb/qgszygb/201411/t20141120\\_582980.html](http://www.mwr.gov.cn/zwzc/hygb/szygb/qgszygb/201411/t20141120_582980.html).

<sup>25</sup> *Communiqué on Water Resource in China 2016*, p. 3, Chinese Ministry of Water Resources, 11 July 2017, available at: [http://www.mwr.gov.cn/sj/tjgb/szygb/201707/t20170711\\_955305.html](http://www.mwr.gov.cn/sj/tjgb/szygb/201707/t20170711_955305.html).

0.55 in 2020 and 0.6 in 2030.<sup>26</sup> Much effort is needed to meet these targets, although they are still lagging far behind the leading international edge.

## Water Pollution

Water pollution in terms of both surface water and ground water is another major challenge. The water quality in India ranked 120th out of 122 countries in the 2003 *World Water Development Report*. Water pollution in the Yamuna river used to result in the shut-down or reduction of production (sometimes as high as 35%<sup>27</sup>) in the major fresh water factory in New Delhi. India also suffers from grave saltwater intrusion: Tamil Nadu, Maharashtra, Punjab, Rajasthan, Hariyana, Gujarat, Karnataka, Uttar Pradesh, Delhi, Odhisa and Bihar are plagued by chronic saltwater intrusion, while water resources in 190,000 km<sup>2</sup> of territory in Rajasthan and Hariyana have been rendered unfit for consumption as a consequence of grave saltwater intrusion. Major reasons for water pollution in India are three-fold. Firstly, the sewage treatment rate in major cities is as low as 31%.<sup>28</sup> Secondly, there is an over-dependency and over-employment of pesticides and chemical fertilizers, which has resulted in grave pollution to rivers and groundwater. Thirdly, the over-development of river water and ground water had resulted in a grave reduction of self-sustainability and self-purification capacity.

As revealed by the *Communiqué on Water Resources 2016* published on July 11, 2017, many rivers in China are badly polluted: 23.1% of all water length monitored in 2016 is evaluated as worse than class III; 78.6% of all lakes suffer from eutrophication; only 58.7% of all water-function zones<sup>29</sup> could meet the qualification standard.

### Uncovering a False Problem: Water as a Possible Challenge between China and India

China and India are interlinked by transboundary rivers such as the Yarlung Zangbo, Senge Zangbo and Ranganchin Zangbo, which originate in the Tibet Autonomous Region in China and run into regions under Indian administration. Uneasiness on water resource development in China is very widespread in India. The details will be discussed below.

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<sup>26</sup> *State Council's Decree on Practicing a Most Strident Water Resource Regulation System*, 16 February 2012, available at: [http://www.gov.cn/zwggk/2012-02/16/content\\_2067664.htm](http://www.gov.cn/zwggk/2012-02/16/content_2067664.htm).

<sup>27</sup> Rumi Ajjaz, 'Water Crisis in Delhi,' *Seminar*, No. 626, October 2011, p. 45.

<sup>28</sup> Prasenjit Chowdhury, 'Mismanagement of Water Resources', *Deccan Herald*, 18 April 2014, <http://www.deccanherald.com/content/3046/mismanagement-water-resources.html>.

<sup>29</sup> 'Mr. Hu Siyi, Deputy Minister for Water Resources, Interprets the "State Council's Decree on Practicing a Most Strident Water Resource Regulation System"'. The State Council approved a water-function zone Scheme on Major Rivers and Lakes: 2011–2030. The major water-function zones comprising 2888 water bodies were grouped into 618 preservation zones (21.4%), 679 conservation zones (23.5%), 458 buffer zones (15.9%) and 1133 development and utilization zones (39.2%).

## **‘Diversion’ of the Yarlung Zangbo and Water Resource Development in the TAR**

Indian concerns are largely focused on the so-call ‘diversion’ of the Yarlung Zangbo. Repeated reports on the diversion of the Yarlung Zangbo have appeared in the Indian media since 2002. Most of these analyses are largely concerned with the so-called Greater Western Route (proposed by an amateur hydrologist) of the South-North Water Diversion Project. According to such arguments, a Greater Western Route is going to divert the Yarlung Zangbo from the Tibetan Plateau into the upper reaches of the Huanghe (Yellow River) and thereby deprive India of its life source and endanger the very survival of 2 billion people living in the lower reach of the Yarlung Zangbo (Brahmaputra).<sup>30</sup> Some claim that China may not have a government plan of diverting the Yarlung Zangbo, but may change its mind at any time, as Beijing is enabled by its geographical location to do so. An observer has added that China may use this diversion design as a threat multiplier to pressure India in China’s favour.<sup>31</sup>

Certain analysts are concurrently critical of China’s hydro-power development efforts on the Yarlung Zangbo. Local authorities in northeastern India try to propagate the view that Chinese water resource development has reduced water supply in the river’s lower reach and therefore call for more effective measures to ‘save’ the Yarlung Zangbo. Natural disasters sometimes also raise the concern of analysts. A flood occurred in regions under Indian administration after a water tank inside the Tibet Autonomous Region collapsed in 2000.<sup>32</sup> India uttered grave concern and thereafter consistently asked the Chinese side to offer more data relevant to transboundary rivers, environmental protection and natural disaster control.

Some analysts have voiced concern and dissatisfaction over Chinese water resource development on the rivers of Western Tibet in general and on the Senge Zangbo in particular. It is said that Shiquanhe Hydro-power Plant on the Senge Zangbo (upper reach of the Indus) might increase India’s vulnerability, as this power plant might be used against India’s water and territorial security in the river’s lower reach. India addressed strong protests to China over a sudden flood caused by the breakdown of a flood control reservoir in August 2000 as a consequence of a landslide along the Pari river inside China. Suspicions emerged in India again four years later when another flood control reservoir broke down as a consequence of an unexpected rock-slide in the same region, despite the fact that the Chinese side promptly notified the Indian side and the emergency was successfully neutralized. A hyper-critical view claimed that the two reservoirs were in fact man-made ‘water bombs’ that could be blown up when needed

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<sup>30</sup> Uttam Kumar Sinha, ‘Examining China’s Hydro-Behaviour: Peaceful or Assertive?’, *Strategic Analysis*, 2012, No. 1, p. 42. IDSA Task Force, *Water Security for India: The External Dynamics*, New Delhi: Institute of Defense and Analysis, September 2010, p. 89.

<sup>31</sup> P. Stobdan, ‘China Should not Use Water as a Threat Multiplier’, IDSA Comment, 23 October 2009.

<sup>32</sup> Lan Jianxue, ‘Water Resource Security and Sino-Indian Relations,’ *South Asian Studies*, No. 2, 2008, p. 27.

to unleash floods as a weapon to endanger India's security. Some analysts claimed that China may build a dam on the Rangching Zangbo (upper reach of the Sutlej, a major tributary of the Indus) to store a large volume of water as a weapon against India.<sup>33</sup>

### Indian Efforts to Neutralize the 'Water Challenge'

Upset by suspicion, New Delhi and its analysts tried to come up with counter-measures. On more than one occasion New Delhi has voiced concern over water development in Tibet. China in response clarified that it has no intention of diverting the Brahmaputra<sup>34</sup> and agreed to offer hydro-data during flood season. This was reciprocated by Indian PM Manmohan Singh, who said in a speech in the Indian parliament that India 'has been assured [by China] that nothing will be done that will affect India's interest', and 'we trust but also verify'.<sup>35</sup> The term 'verify' implies that India in fact checked the situation on the ground by its own means. India also voiced appreciation of the offer to share hydro-data during flood season and to help in emergencies, as expressed in the Joint Statements issued by China and India in May 2013 and May 2015.<sup>36</sup>

Domestic politics also contribute to the water issue. Rajnath Singh (the Indian Minister of Home Affairs under the incumbent BJP-led government with Modi as Prime Minister), when he was a leading opposition MP in 2012, wrote two letters to the then PM Manmohan Singh within one year, demanding that an official team visit China to discuss reports about the diversion of the Yarlung Zangbo, and urgently recommending a joint inspection of the Yarlung Zangbo in China to assess the actual situation on the ground.<sup>37</sup> During the Indian Prime Minister Narendra Modi's visit to China in May 2015 the chief minister of Assam asked Modi to discuss the transboundary river issue in a candid way with his Chinese counterpart. He shortly thereafter criticized Modi for having taken a 'soft' stance in Beijing and having thereby committed a grave injustice against the people of Assam.<sup>38</sup>

<sup>33</sup> P. K. Gautam, 'Sino-Indian Water Issues', *Strategic Analysis*, 2008, No. 6, pp. 969, 972.

<sup>34</sup> 'China Has No Plan of Water Diversion from Yalung Zangbo', *Yangcheng Evening News*, 26 May 2009. 'Ministry of Water Resource: China at Present Has No Design of Yarlung Zangbo Water Diversion Project', Xinhua News online, 13 October 2011.

<sup>35</sup> 'We Trust China on Dam: Manmohan Singh', *Times of India*, 5 August 2011, <http://timesofindia.indiatimes.com/india/We-trust-China-on-dam-Manmohan-Singh/articleshow/9486696.cms>.

<sup>36</sup> *Joint Statement between the People's Republic of China and the Republic of India*, 15 May 2013, [http://www.fmprc.gov.cn/mfa\\_eng/wjdt\\_665385/2649\\_665393/t1042798.shtml](http://www.fmprc.gov.cn/mfa_eng/wjdt_665385/2649_665393/t1042798.shtml). *Joint Statement between the People's Republic of China and the Republic of India*, 15 May 2015, [http://www.fmprc.gov.cn/mfa\\_eng/wjdt\\_665385/2649\\_665393/t1265496.shtml](http://www.fmprc.gov.cn/mfa_eng/wjdt_665385/2649_665393/t1265496.shtml).

<sup>37</sup> Nishit Dholabhai, 'BJP Seeks Water Treaty', *The Telegraph*, 4 March 2012, [https://www.telegraph-hindia.com/1120305/jsp/frontpage/story\\_15212624.jsp](https://www.telegraph-hindia.com/1120305/jsp/frontpage/story_15212624.jsp).

<sup>38</sup> 'PM did grave injustice to people of Assam: Gogoi', *Business Standard*, 19 May 2015, [http://www.business-standard.com/article/pti-stories/pm-did-grave-injustice-to-people-of-assam-gogoi-115051901448\\_1.html](http://www.business-standard.com/article/pti-stories/pm-did-grave-injustice-to-people-of-assam-gogoi-115051901448_1.html).

New Delhi also proposed a water sharing treaty with China in 2013, while its analysts have been even more active in discussing such an arrangement. It is said that a water treaty would allay fears about the lower riparian zone. The Indus Water Treaty between India and Pakistan and the Ganga Water Treaty between India and Bangladesh are frequently cited as historical evidence of the need for such treaties. China to date has not provided an affirmative response to the proposal.

Think tanks and analysts, as distinct from government, are more vocal in this regard. Major research recommended early on, more precisely, pre-emptive development of water resources in down streams to establish user rights.<sup>39</sup> Such efforts can be seen as an implementation of India's own water diversion project (the National River Interlinking Project) or as further progress on hydro-projects such as the Upper Siang Hydroelectric Project.<sup>40</sup> The regionalisation of the transboundary river issue has been recommended by the leading elite, including BJP leader Rajnath Singh, who wrote to the then PM in 2012, arguing that Bangladesh can also be taken on board when trying to sign a water treaty with China.<sup>41</sup> Another recommendation is to internationalize water resources in Tibet by defining Tibet's water as common for humanity.<sup>42</sup>

### A Brief Clarification and Evaluation from China

It must be pointed out that such 'concerns' are in fact nothing more than groundless speculation. The so-called Greater Western Route of the South-North Water Diversion Project is in fact the personal idea of an unofficial amateur hydrologist. It has never been identified as government policy. The South-North Water Diversion Project comprises the Eastern, Middle and Western routes, but the so-called Greater Western Route is in fact non-existent as far as government policy is concerned. China is taking an active yet prudent approach in terms of large scale transregional water diversion projects. In fact, due to biological diversity, hydro-security and cost-efficiency concerns, the Western Route (originating in Sichuan, not Tibet) has been suspended indefinitely for in-depth review, let alone the so-called Greater Western Route.<sup>43</sup> The Chinese government has repeatedly stipulated that it has no such plans. The former Chinese Minister of Water

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<sup>39</sup> Medha Bisht, 'Dams in Arunachal Pradesh: Between Development Debates and Strategic Dimensions', 1 February 2010, [http://idsa.in/idsacomments/DamsinArunachalPradesh\\_mbisht\\_010210](http://idsa.in/idsacomments/DamsinArunachalPradesh_mbisht_010210); IDSA Task Force, *Water Security for India: The External Dynamics*, New Delhi: Institute of Defense and Analysis, September 2010, p. 51; Hari Bansh Jha, 'Diversion of the Brahmaputra: Myth or Reality?', IDSA Comment, 9 August 2011, [http://idsa.in/idsacomments/DiversionoftheBrahmaputraMythorReality\\_hbjha\\_090811](http://idsa.in/idsacomments/DiversionoftheBrahmaputraMythorReality_hbjha_090811).

<sup>40</sup> Hu Xuecui, 'Dispute over Yarlung Zangbo', *China Energy News*, June 27, 2012, <http://www.chinapower.com.cn/newsarticle/1161/new1161781.asp>.

<sup>41</sup> Nishit Dholabhai, 'BJP Seeks Water Treaty', *The Telegraph*, March 4, 2012, [https://www.telegraphindia.com/1120305/jsp/frontpage/story\\_15212624.jsp](https://www.telegraphindia.com/1120305/jsp/frontpage/story_15212624.jsp).

<sup>42</sup> IDSA Task Force, *Water Security for India: The External Dynamics*, New Delhi: Institute of Defense and Analysis, September 2010, p. 51.

<sup>43</sup> For detailed information on the South-North Water Diversion Project, see the official website of the Project Office under the State Council of China, <http://www.nsb.gov.cn/zx/gcgh/>.

Resources, Wang Shucheng, has on more than one occasion openly voiced his strong disapproval if not outright criticism of the proposal, calling it unnecessary, unworkable and unscientific.<sup>44</sup> Even if implemented, the so-called Greater Western Route would not significantly enhance water security in China, while its potential negative consequences for China are too grave to be neglected. China's water security challenge is a very complicated matrix covering uneven distribution, water pollution, low water use efficiency and water scarcity (resource-, management-, pollution- and infrastructure-related scarcities). If implemented, the diversion of the Yarlung Zangbo into the upper Huanghe (Yellow River) might help relieve resource-related water scarcity in Northwest China to a very limited extent by reducing uneven water distribution between Southwest and Northwest China, but it could hardly resolve the nation-wide challenges linked to management-, quality- and infrastructure-related water scarcity. What is more, it would not help relieve water pollution and low water use efficiency. At the same time, no reliable studies on its ecological and environmental impact are available yet. Prudence should therefore be the utmost priority. Moreover, China has taken a responsible and prudent course with regard to water resource development in order to ensure peace and stability in the region and secure the legitimate and reasonable interests of all the parties involved. The so-called Chinese design of damming rivers in the upper reaches with the intention of using them as instruments to hold the lower reaches hostage is nothing more than groundless speculation unsupported by facts. It must be pointed out that India's hyper-concern over the 'diversion' of the Yarlung Zangbo (Brahmaputra) started around 2002, the year India was involved in heated discussions over its own mega water-diversion project, the National River Interlinking Project. This coincidence, if such it be, has given rise to suspicions over India's real intentions: whether such discussion about China is anything more than a cover for its own design or a way of finding a scapegoat to justify India's water diversion plans. This question remains unanswered.

For China, it must be pointed out that a fact-based and comprehensive approach is very much needed when it comes to water development in Tibet. The development of water resources and hydro-power potential in Tibet on a moderate scale is legitimate, reasonable and necessary as population growth and economic development in Tibet is going to increase consumption of both water and electricity. For the long-term benefit of Tibet and its people, such development must be implemented sustainably and ecologically. In this context, large scale development, such as a major diversion of water

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<sup>44</sup> 'Technically Unworkable: Mr. Wang Shucheng Vetoes the Greater Western Route Once again', *The Beijing News*, 14 March 2007; 'Wang Shucheng: Greater Western Route Unnecessary, Unworkable and Unscientific', *Nanfang Weekend*, 30 June 2011, [http://www.nsb.gov.cn/zx/rdht/201107/t20110701\\_187339.html](http://www.nsb.gov.cn/zx/rdht/201107/t20110701_187339.html); 'China Has No Plan of Water Diversion from Yalung Zangbo', *Yangcheng Evening News*, 26 May 2009, [http://www.ycwb.com/ePaper/ycwb/html/2009-05/26/content\\_507551.htm](http://www.ycwb.com/ePaper/ycwb/html/2009-05/26/content_507551.htm); 'Ministry of Water Resource: China at Present Has No Design of Yarlung Zangbo Water Diversion Project', Xinhua News online, 13 October 2011, [http://news.xinhuanet.com/society/2011-10/13/c\\_122153872.htm](http://news.xinhuanet.com/society/2011-10/13/c_122153872.htm).

resources in Tibet, is not advisable. On the other hand, the diversion of the Yarlung Zangbo is not very helpful in terms of dealing with water scarcity because this program, even if implemented, can at most help relieve water scarcity in northwestern China and reduce the resource imbalance between Northwest and Southwest China. It anyhow cannot help relieve the nation-wide water challenge linked to management-, quality- and infrastructure-related water scarcity as well as water pollution and low water use efficiency. All in all, utmost prudence needs to be maintained.

### **Tackling the Real Challenges to China and India: Exploring Cooperation**

Despite a strong ‘water dispute’ undercurrent, the two countries need to explore cooperation on water security in order to serve people’s interests and ensure the sustainable development of both China and India. However, it is regrettable that for China and India the potential for cooperation in responding to common challenges has received little attention so far. Researchers from both China and India need to work together to explore workable cooperation programs rather than just agree to cooperate in principle and leave the more detailed and painstaking work of implementation for later. Neither lip service, statements of theoretical necessity, nor unrealistic designs are advisable here. A pragmatic step-by-step approach is therefore suggested to achieve real and meaningful progress. Some possible forms of cooperation will be discussed in the following paragraphs, but the discussion will have to be started with one paragraph rejecting joint development on the Yarlung Zangbo (Brahmaputra).

#### **Joint Development on the Yarlung Zangbo Not Workable in the Foreseeable Future**

China and India are currently collaborating on the exchange of hydro-data concerning the Yarlung Zangbo (Brahmaputra). Proposals for further cooperation on cross-border water resources have been voiced by both countries. Although a desirable scenario, this is hardly workable at present or in the foreseeable future due to a number of factors. From a Chinese perspective, it is less than attractive because of its potential relevance to the Sino-Indian border demarcation and territorial dispute, which is of bigger significance for both China and India. China might feel reluctant because any of its statements or actions concerning joint development on the Yarlung Zangbo, especially on the other side of LAC, might produce unknown consequences. This reluctance is further amplified by the less-than-constructive voice from India’s side, as policy suggestions made by Indian scholars and think tanks are in fact largely confrontational rather than cooperative.<sup>45</sup> India, on the other hand, is far from ready

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<sup>45</sup> IDSA Task Force, *Water Security for India: The External Dynamics*, New Delhi: Institute of Defense and Analysis, September 2010, pp. 42, 48–51; Uttam Kumar Sinha, *Riverine Neighbourhood: Hydro-politics*

for any such joint development, considering the sensitive and sometimes sensational controversies in its northeastern part over Yarlung Zangbo (Brahmaputra) water utilization. Considering this context, any major water resource development initiatives, and with another country in particular, might add fuel to the already uneasy situation. Bangladesh, as another major riparian area and water consumer of the Yarlung Zangbo (Brahmaputra), must be taken into consideration in any major development on the upper and middle reaches of this river. Dhaka might be worried about such joint development, as its domestic, agricultural and industrial water consumption is truly dependent on rivers from outside its boundaries (including the Yarlung Zangbo). Undoubtedly, both China and India, as upper/middle riparians and major stakeholders for regional stability, must pay serious attention to the legitimate and rightful concern of Dhaka. A trilateral arrangement, on the other hand, would be extremely difficult due to the complicated dynamics among these countries. Last but not the least is the insufficient expertise and infrastructure in terms of transportation and power facilities for water resource development in such a complicated topographical context. No feasibility study on the possible ecological, hydrological and geological consequences has ever been made. As a result of these difficulties, one has to conclude that joint development of the Yarlung Zangbo is not a realistic option in the foreseeable future.

### **Joint R&D**

Due to the reasons discussed in the previous paragraph, China and India need to go beyond the boundary river paradigm when trying to develop meaningful cooperation on water security. Considering the popular dictum in China that ‘science and technology are the foremost important productive force’, expertise on water-saving and pollution control can be a pragmatic option, since this is going to help the two countries to make progress on water use efficiency improvement and water pollution control.

Joint research in the social sciences in general, and in policy studies relevant to water in particular, is also of great significance, since water management is more a policy issue than a technological one. Let us take the water user association (WUA) as an instrument of participatory management of irrigation as an example. Although this is encouraged in both China and India, in-depth research on its real practise is hardly available, as a consequence of which the successes and failures of WUA and the reasons behind them have not been well understood. Some reports in China indicate that poor irrigation tariff collection from free-riders has compromised the interests of other WUA members. On the other hand, WUA in India’s Andhra Pradesh is regarded as too dependent on outside sources.<sup>46</sup> It is obvious that both China and India could learn

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*in South Asia*, New Delhi: Pentagon Press, 2016, pp. 126-128; ‘India-China Riparian Relations: Towards Rationality’, IDSA website, 16 January 2015, [http://idsa.in/event/IndiaChinaRiparianRelations\\_uksinha.html](http://idsa.in/event/IndiaChinaRiparianRelations_uksinha.html).

<sup>46</sup> V. Ratna Reddy, *Water Security and Management: Ecological Imperatives and Policy Options*, New Delhi: Academic Foundation, 2009, pp. 100–101.

from each other's experience to ensure better performance of WUA. Water pricing deserves serious study in both countries. As a universally acknowledged effective policy encouragement to increase water use efficiency, reasonable water pricing is in fact not always an easy job. A reasonable water pricing system must strike a balance between the affordability of reasonable water volume consumption for domestic use (particularly among low-income groups) and effectiveness in checking over-consumption above reasonable levels. By learning from each other, both China and India would benefit a great deal in improving their policy instruments such as the WUA system and water pricing policies.

### **Hydro-Business Cooperation**

The rapidly developing Sino-Indian commodity trade reached 71.18 billion USD in 2016. At the same time, China is actively considering expanding its investment in the manufacturing and infrastructure sectors in neighbouring countries, including India. This could be translated into hydro-business cooperation covering water-saving industry, water pollution control industry and water infrastructure construction (either big or medium-sized). Trade in machinery, equipment and materials relevant to water industry needs to be encouraged, as this will help both countries to effectively deal with hydro-security challenges. Investment relevant to water saving and water pollution control should be a focus, as China could make good use of India's competitive labour force and innovative research while India could try to take a lead on the huge Chinese market. Being equipped with substantial expertise and experience, Chinese construction firms are capable of building the much needed first-class hydro-infrastructure in India at the most competitive price. This will not only benefit both neighbours, but also develop shared and expanding economic interests for business in China and India, thereby transforming inter-governmental cooperation into non-governmental and self-sustained business-to-business cooperation.

### **Joint Efforts for a Fair International Water Regime**

International cooperation, both regional and global, is needed for an effective response to water challenges. By effectively responding to water challenges, China and India as major water consumers will significantly contribute to the global endeavour of saving water, ensuring sustainable development and limiting climate change. Their success might strongly encourage other major water consumers in taking needed and effective measures. The failure of either China or India in this regard on the other hand will not only result in disastrous consequences for themselves, but also in large-scale disasters with a global impact.

China and India are therefore advised to join forces in negotiating with the Global North for a fairer and more sustainable water regime. The two neighbours are advised

to bargain with the Global North regarding the transfer of technological know-how and expertise on water use efficiency, water saving and pollution control programs. China and India may need to work together with advanced economies equipped with water saving techniques and expertise rather than with those who care less about such issues. The US, although it is the single global superpower, might not be the top potential partner in this regard, since its water use efficiency is far from satisfactory as a consequence of its rich water resources and moderate population. Cooperation with Europe, Japan and Israel, on the other hand, could be a priority, as these regions have higher water use efficiency and better developed water-saving expertise and industry. Cooperation on the water issue with Japan, considering geographical proximity and ecological and climate relevance, might be a first preference for both countries.

### **Conclusion: The Need to Go Beyond Three Paradigms**

The water challenges of both China and India are real and severe. Quite contrary to the ongoing academic discussion, however, such challenges are in fact more domestic than transnational in nature. Discussion of their international dimension is understandable, but giving it too much focus in fact diverts attention away from the more serious domestic water security problems and is therefore somewhat misleading. China and India need to devise their own method of tackling water security challenges in their own country, while international cooperation will definitely be of great help to both countries in this regard. For such cooperation to be truly successful, the two countries need to go beyond three old paradigms.

The first is the scarcity-conflict paradigm. It must be clarified that scarcity is an objective fact that can lead to either cooperation or conflict, depending on the policy responses to this challenge. In other words, scarcity is a precondition of conflict, but does not necessitate such a scenario. Some studies have revealed a different picture; for example a 2003 study by the UNESCO World Water Assessment Programme indicated that most water disputes can be resolved by positive means. Violent instruments such as military conflict or war are not a frequent option. In fact, increased engagement as a result of disputes is more likely to bring about cooperation in various forms instead of intensified conflict.<sup>47</sup> Suffice to say that the scarcity-conflict paradigm can be very misleading, as possible ways out will be very unlikely if it prevails. Ironically, this paradigm is more relevant to India than to China, because it is India rather than China that suffers from a more severe scarcity, consuming more water and, according to the logic associated with the paradigm in question, is more likely to produce uncertainty.

The second is the capacity-conflict paradigm. As the upper riparian, China enjoys a favourable geographical endowment. This, as perceived by some suspicious analysts,

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<sup>47</sup> Yang Xiaoping, 'Go Beyond the "Scarcity-Conflict" Paradigm: Transboundary Water Resource Issue between China and India', *International Forum*, No. 4, 2012, p. 38.

can be translated into capacity against the lower riparian. Although the sensitivities of the lower riparian are understandable, the capacity-conflict paradigm is not much help to either side, as reasonable policy discussions cannot be based on speculations out of subjective concerns over the capacity of another country. Interestingly, we again find that India can be a victim of this paradigm, as it is a lower riparian country vis-à-vis China, Nepal and Bhutan but an upper riparian vis-à-vis Pakistan and Bangladesh. The same logic designed against China by some analysts can be applied to India as well. In fact, this has happened more than once as Pakistan and Bangladesh have voiced concerns against India's water resource development such as the Kishanganga Project on the Indian side.

The last is the transboundary river paradigm. When considering bilateral cooperation on water, observers largely prefer to focus on transboundary rivers only, taking China and India as an example. Notwithstanding much talk about the Yarlung Zangbo, the joint development of water resources along this river, due to the reasons discussed in the previous paragraphs, is not feasible in the foreseeable future. That is to say, analysts need to think beyond the Yarlung Zangbo and try to be as innovative as they can when exploring win-win cooperation.

For the benefit of both China and India, a real willingness to cooperate instead of lip service needs to be nurtured. Apprehension of China on the water issue is widespread in India, although New Delhi is relatively prudent at present in making use of these fears. However, the problematization of a non-existent issue can only serve to complicate bilateral relations and reduce much-needed trust. With regard to the Chinese research literature, the moderate concerns over downstream development are balanced by tentative discussions on cooperation. These discussions, regretfully, have not gone beyond very general principles and no detailed proposals have been tabled yet. If the two sides agree to cooperate, a policy dialogue might get started. An exchange of ideas on a more detailed cooperation program will be encouraged by such a major step forward.

All in all, effective cooperation on water security between China and India, two major water consumers, will have regional if not global significance. Cooperation on water security is a must rather than merely an option for both countries. It is the responsibility of scholars, media and policy researchers from both China and India to concentrate on the real water challenges and join forces in exploring cooperation.