Managing Asia’s Most Precious Resource

Asia’s water problems are particularly acute. The region is home to 60 percent of the world’s population but has only 36 percent of global water resources. That stark imbalance is sobering. If Asia is to continue to prosper and do so in an atmosphere of peaceful relations among nations, then greater co-operation on water issues will be critical.
Stress and Challenges: What’s Facing China’s ‘Nine Dragons of Water’

By Lyu Xing

China’s vast landmass, varied topography, massive population and rapid economic development have ensured that issues related to the use and management of water are becoming more urgent for the government and the public with each passing year.

And with China sharing 40 rivers and lakes with neighboring countries, water policies in China are increasingly a subject of interest and concern throughout the region. Lyu Xing looks at the challenges.

China is a water-stressed country, despite ranking third in the world in terms of its water resources. On a per capita basis, however, water ownership is only a quarter of the world average, amounting to 2,173 cubic meters per person. As a result, one third of China’s 640 cities are experiencing some form of water shortage. The water stress also has a significant impact on agricultural production. Every year around 12.5 percent of farmland is reported to have a loss in yield due partly or totally to insufficient water. Seventy percent of rural households in Northern China experience water shortages. Meanwhile, demand for water is increasing. Water supply in 2013 increased to 618.3 billion cubic meters, nearly six times that of its level in 1949 and 11.8 percent greater than in 2000. Demand is expected to increase to 1,000 billion cubic meters by 2030, accounting for 35.2 percent of the country’s total water resources. Critics point out that China cannot afford to bear this water burden, because many scientists believe the maximum supply ceiling is 812.6 cubic meters.

Moreover, variations in water distribution worsen accessibility to scarce water. Northern China has only one third of the country’s total water, while southern China possesses two thirds. The average ownership per capita in the north is only 20 percent of what it is in the south. Southwest China is well known for the “Asian Water Tower” on the Tibetan plateau, but this water is hardly accessible for the local population due to the mountainous topography.

In addition, precipitation is highly concentrated in the rainy season. With 70 to 80 percent of rainfall between June and September, much of it runs off as floods. To combat the uneven distribution, China has built more than 860,000 water storage facilities at the local and national level with a total capacity of 692.4 billion cubic meters, but the high costs of these facilities have become a financial burden. For example, the South-North Water Transfer Central Project, which was completed Sept. 8, 2013, involved a first-phase investment of 300 billion yuan (US$48 billion).

Climate change, meanwhile, is intensifying uncertainty about water supply, especially in the north. One study found that precipitation increased by 1 percent and surface water 17 percent in the largest four river basins of Northern China between the periods 1965-1979 and 1980-2000. The droughts had a negative impact on grain production in northern and northeastern China. Southern China, meanwhile, experienced frequent flooding.

Another study found that precipitation during 1987-1996 in Northwest China increased 16-18 percent compared to 1967-1986. Although scientists have not reached a consensus on future climate change, they do warn of greater uncertainty and consequences.

Issues Behind the Crisis

In this essay, I survey the range of water issues China faces and the governance issues that are central to addressing them:

Water diversion: Water extraction and water resource development have had a huge impact. A large volume of water is being diverted to urban and industrial use. One study revealed that water for agricultural production decreased from 91.7 percent of total water usage in 1949 to 75.5 percent in 1997 and 60 percent in 2012. It is expected to further decrease to 54 percent by 2050. Northern China, one of the country’s “rice bowls,” is under the greatest pressure. The loss of grain production is estimated to be in a range of 1.5 billion yuan to 14.5 billion yuan per year due to drought.

Over-extraction of water has chronically dried up many rivers, with the Yellow River a typical example. Experts warn that China’s food security could be jeopardized if this trend is not reversed.

The Yellow River is the second-largest river in China. It originates in the Qinghai Autonomous Region and runs through Sichuan, Gansu, Ningxia, Inner Mongolia, Shanxi, Henan and Shandong Provinces. It is 5,464 kilometers long with an area of 795,000 square kilometers. Water from the Yellow River is crucial to life within the basin. A total of 3,147 storage facilities, including 11 large dams, were built to capture water. And yet, battles over the river’s water continue, with local authorities rushing to take water from it. This chronic problem resulted in more than 20 instances where the water dried up between 1972 and 1997, until a tough water allocation system was established in 1999. The drying of the river endangered 2.1 million hectares of farmland in the lower river basin. In 1995, 1.7 million hectares of farmland were left with insufficient irrigation and a loss of 1.25 million tons of grain, valued at 6.75 billion yuan. Similar situations occurred with the Tarim River and the Shiyang River in Northwest China.

Water pollution: Increased water pollution erodes the availability of water and threatens public health. According to 702 official monitoring spots on China’s largest 10 rivers, 28.8 percent of water is not fit for human consumption. One study shows that 50 percent of water isn’t good to fish in, while 25 percent is unfit for agricultural use. Half of China’s cities have polluted ground water. Water pollution is more prominent in the deltas of the Yangtze River and the Pearl River due to industrialization.

Pollution of the Huai River in eastern China has attracted nationwide attention since 1995.
The Huai River is important because the basin hosts 15.2 percent of the country’s total farmland and 16.2 percent of its total population, despite accounting for only 3.5 percent of the total territory and 3.4 percent of water ownership. The basin is also host to less developed, poverty-stricken areas within Anhui, Henan, Shandong and Jiangsu provinces. Water quality, which began deteriorating in the 1980’s due to intensive farming, industrial development and urbanization, eventually became unsuitable for agricultural and industrial use in 1995. With support from the central government, four provincial governments then started to fight the pollution. To date, 100 billion yuan has been invested in pollution control. However, 45 percent of the river’s water is still not suitable for human consumption or industrial use. Another example is Dianchi Lake in Yunnan Province, whose waters are still not suitable for humans and industry after 10 years of pollution control efforts at a cost of more than 20 billion yuan.

Hydropower development: China’s hydropower development has received international and domestic attention. Critics argue that hydropower has inevitable social and environmental impacts, although hydropower provides renewable energy for economic development. There have been more than 15 million people involuntarily resettled since 1949 because of dams. The fact that many resettled people still live in poverty forced the central government to adopt a 20-year assistance program that began in July 2006. The program provides subsidies in an effort to enable those who have been resettled to restore their livelihoods. The environmental impacts of dams are also serious and sometimes devastating. This is evident in the development of hydropower on the Jinsha River, upstream of the Yangtze, Asia’s largest river and the third-largest in the world.

One study shows that 50 percent of water isn’t good to fish in, while 25 percent is unfit for agricultural use. Half of China’s cities have polluted ground water.

The Yangtze originates in western China, runs through central and eastern China, and accounts for a third of total land territory and one-fifth of the country’s population. The river’s delta contributes 20 percent of total gross domestic product. However, hydropower development threatens the ecosystem. A joint study by the Ministry of Agriculture and the World Wildlife Fund warned that the fishery in the Jinsha River is on the brink of collapse. Twenty-five mainstream hydropower projects are planned, under construction or in operation. Hundreds of small and medium-sized dams have been built on tributaries of the Yangtze. The number of fingerlings in the Yangtze River has plummeted to 100 million from 30 billion in the 1950s. During a 12-day study tour of the Jinsha River, only 17 fish species were observed, despite historical records of 143 fish species in the river. Damage and loss of habitats are mainly responsible for the looming collapse. The study called for urgent action regarding the regulation of hydropower development, rehabilitation of habitats and fish stocks, and protection of biodiversity.

International rivers: China not only has to fight a domestic water crisis, it also has water conflicts with neighboring countries. China shares more than 40 rivers and lakes with its neighbors. There are 15 major international rivers connecting 19 countries with 3 billion people. Every year, 400 billion cubic meters of water flows out of China, equivalent to the flow of the Yangtze River. China may have to deal with potential water conflicts involving Russia, Central Asian countries, India and mainland Southeast Asia.

The Amur River, for example, is shared by Mongolia, China and Russia. China and Russia have been discussing how to develop the river since 1956 and have yet to make real progress. China is more interested in hydropower development, flood control and navigation, while Russia is interested in flood control, navigation and river ecology. In other words, Russia is more concerned with environmental issues related to river development. The differences in priorities are one obstacle to bilateral co-operation. Another is potential national boundary changes resulting from altering riverbeds and water courses. On Nov. 13, 2005, a factory in China exploded and leaked huge quantities of chemicals into the Songhua River, a tributary of the Amur River. China informed Russia immediately, took emergency action and paid the clean-up costs. Still, the event heightened environmental concerns in both countries.

China shares two rivers, the Irtys River and the Ili River, with Kazakhstan and other countries. Kazakhstan and China’s Xinjiang Province are both water-stressed. Kazakhstan is especially concerned about water consumed by China. The two countries established a joint river committee to monitor and study water issues in 2001 and signed an agreement on water protection in 2011. A joint water diversion project was also implemented in the same year, in which each country would share 50 percent of the diverted water. However, fast-growing cotton in Xinjiang is creating more demand for irrigation water and may increase water tensions between the two countries in the near future.

China’s hydropower development in upstream parts of the Brahmaputra, Salween and Mekong rivers has created concerns in downstream countries. Since 2001, China has shared hydrologic information on the Brahmaputra with India. Beijing’s new energy plan was made public in January 2013, which revealed its intention to develop hydropower on the Brahmaputra. This triggered widespread criticism in the Indian media, and the Indian government on Jan. 31 officially expressed its concerns to the Chinese government and complained about not having been consulted. Earlier, in 2004, China suspended, for a while, its hydropower development on the Nu River, upstream of the Salween, due to downstream complaints. Hydropower development on the Lancang River, upstream of the Mekong, has been a source of tension between China and countries in the lower Mekong Basin. For its part, China believes its upstream hydropower development has less negative impact on downstream countries than they believe, and has benefits in terms of flood control and navigation. However, downstream countries disagree and have asked for greater transparency and co-operation. The tensions may not result in direct conflicts with these countries, but could escalate under certain special circumstances. During a five-year drought in Yunnan Province in 2009-2013 and water flows out of China significantly decreased. However, the media in down-
Insufficient public participation and transparency: Many laws and legal documents in China specify that the public should be allowed to participate in debates and discussions over policy formation, infrastructure development and government programs. However, public participation is still limited. The underlying principle of “prior, free and informed consent” is not widely recognized or fully implemented. As a result, a lot of development programs and projects involving water resources are formulated without effective public participation. This is, in part, because of a lack of transparency. Much information related to water is classified as confidential data and is not accessible to the public. Reports on environmental impact assessments, a crucial document for effective public participation, are still not accessible to the public, although civil society has been lobbying to make this happen for many years.

With public concerns about China’s water-related issues only likely to grow, it is expected that transparency will be improved in the future.

Lyu Xing is Associate Professor and Director of the Environment Program of Institute of Southeast Asian Studies at Yunnan University, China.

**FREE ONLINE: 15th Anniversary Articles**

To celebrate the 15th anniversary of *International Relations of the Asia-Pacific*, the Editors have selected 15 articles that have enhanced our understanding of international politics in Asia.

- Sino-Japanese relations: power, interdependence, and domestic politics
- East Asia and international relations theory
- Introduction to the special issue: regional rivalries and order in East Asia
- Democracy and diversionary incentives in Japan-South Korea disputes
- External threats, US bases, and prudent voters in Okinawa

Editor-in-Chief:
Yoshihide Soeya, Keio University, Japan
G. John Ikenberry, Princeton University, USA

[www.irap.oxfordjournals.org](http://www.irap.oxfordjournals.org)