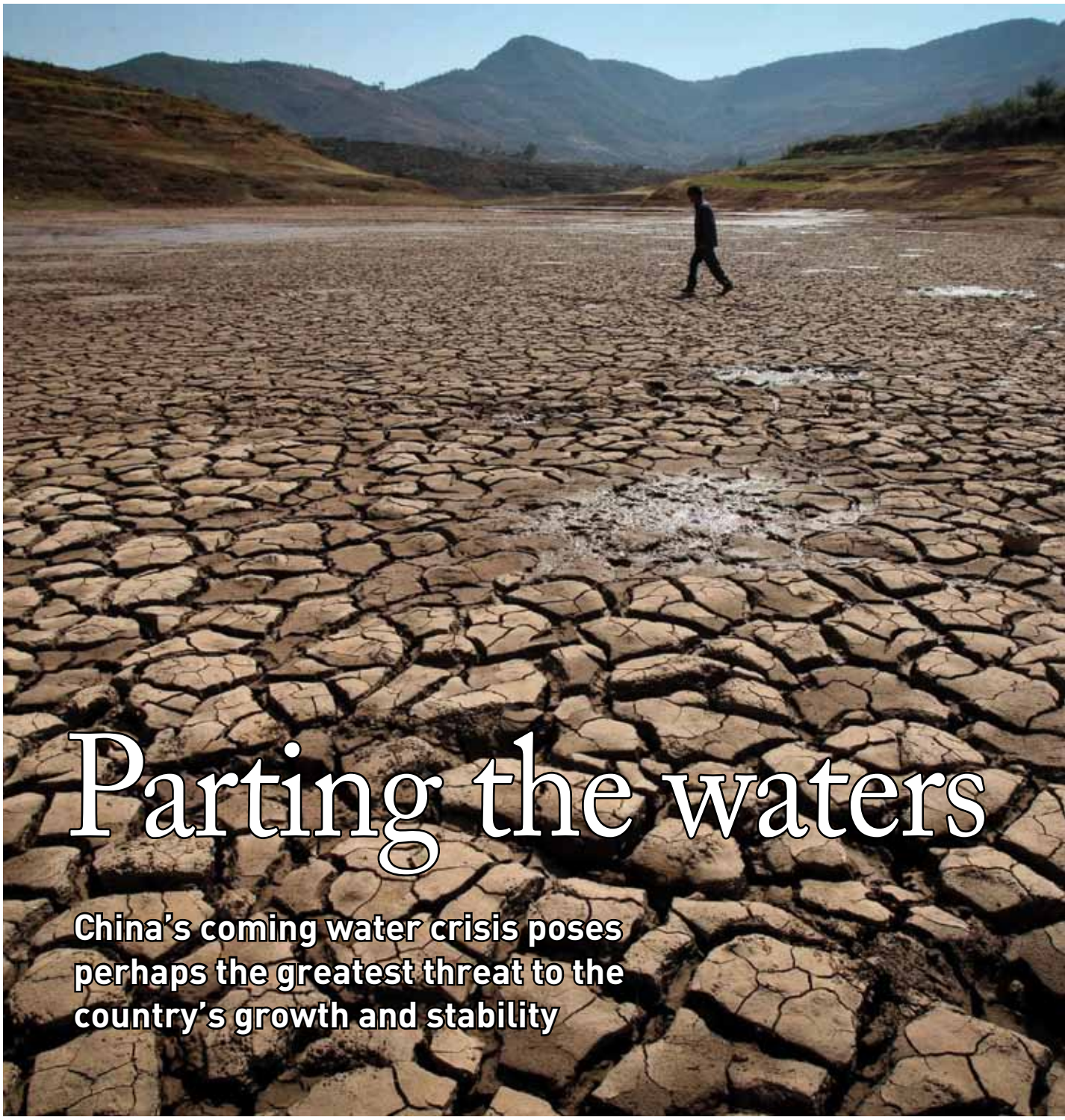

Parting the waters

China's coming water crisis poses perhaps the greatest threat to the country's growth and stability

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Imaginechina

The Yarlung Tsampo River has hurtled down from the Himalayas for millennia, cleaving the mountain range in two and creating one of the world's steepest and longest canyons. The river forms a huge bend in the remote southeastern corner of the Tibet before flowing into India and Bangladesh and on to the Bay of Bengal.

The Yarlung Tsampo is by far the largest river to cross China's borders. It is also one of the world's most promising sources of hydropower. A 510-megawatt hydropower station is already under construction on the river, and Beijing has studied the feasibility of building a dam at the river's bend to generate 40,000 megawatts of electricity each year, twice that of the giant Three Gorges Dam.

In India, these projects are inciting anger and worry. Some in New Delhi claim Beijing is also planning to divert water from the river, which India calls the Brahmaputra, through the Himalayas and on to China's parched north. Chinese officials have denied any such intention: They say such a diversion would cause too much damage to the environment and bilateral relations. Yet Indian suspicions that China will mismanage this wealth of water continue to mount.

A shaky foundation

The water resources of the Tibetan plateau seem likely to give rise to more international conflicts in the decades to come. Sometimes called "the third pole" because of its massive glacial ice deposits, the plateau is the source of five major international rivers – the Brahmaputra, Salween, Mekong, Arun and Irtysh-Illy – as well as China's Yangtze, Yellow and Pearl rivers. Altogether, they support nearly one-third of the world's population.

Asia's bright economic prospects are often taken for granted. Yet rapid economic and population growth is sucking dry the continent's already-scarce water resources. Asia has three-fifths of the world's population but just one-third of its water resources.

This shortage threatens to derail Asia's future, either by constraining economic growth or destabilizing its decades-long peace, argues Brahma Chellaney, a professor of strategic studies at India's Centre for Policy Research and the author of "Water: Asia's New Battleground."

China is at the center of Asia's water debate, both because it controls much of the continent's glacial water resources in the Tibetan plateau and because it is also experiencing a worrying water shortage.

China's per capita water availability is only about one-quarter of the world's average, and what resources it has are distributed unevenly. Northern China supports about half of the country's population and most of its agriculture, yet it has only about 20% of its water, said Ma Jun, director of China's Institute of Public and Environmental Affairs.

Droughts in the north and northwest already constrain agricultural and industrial output, and excessive water withdrawals and unsustainable farming practices are encouraging the creep of desertification. Rampant water pollution has exacerbated these shortages, making usable water scarce even in the water-rich south, Ma said.

Climate change will only worsen the situation. Although China's renewable water supplies are expected to initially increase as the glaciers of the Himalayas melt, the water flow could start to dwindle by mid-century. The 2030 Water Resources Group projects that China's water demand will outstrip supply by about 25% by 2050.

Such a shortage would put huge constraints on economic growth. Rising costs could squeeze production at water-intensive industries, including steel, chemicals and power generation, and cause the price of locally grown crops to spike. China's poor may find themselves unable to afford sufficient food and water, a situation that could easily spark social unrest.

The course of history

Beijing has chosen to address this outsized problem with an equally massive solution: the South-North Water Diversion (SNWD).

Diversion projects have been used around the world to channel water from areas of abundance to scarcity, but never before on this scale. The SNWD project will divert 44.8 billion cubic meters of water from the Yangtze River in central China to depleted rivers in the north through three channels, two of which will be more than 1,300 kilometers long. China Greentech Initiative, a consultancy, compares the task to "transferring Lake Erie to Texas within 10 years."

The project's monetary and social costs are no less striking. US non-profit organization International Rivers estimates the project's total cost will be US$62 billion, roughly twice the cost >>

>> of the massive Three Gorges Dam.

The mega-scheme was approved in 2002 after 50 years in planning. Mao Zedong first proposed the diversion in 1952, saying, "Water in the south is abundant, water in the north scarce. If possible, it would be fine to borrow a little." The idea fit perfectly with Mao's ethos of bending nature to human will, but it proved too technically complicated for the time. The plan was tabled until 1992, when Premier Li Peng, a trained hydroelectric engineer, resurrected it for study.

As the massive project enters its second decade of construction, it is clear that "borrowing a little" water is not nearly as straightforward as Mao implied. All three routes of the water diversion project have experienced serious setbacks.

The eastern leg, which directs water from the mouth of the Yangtze to the northern port of Tianjin, was intended to supply water to the north by the 2008 Olympics, but severe water quality problems have delayed its completion until 2013. The route is simplest from an engineering perspective, since it follows the 1,400-year-old Grand Canal and draws water from where the Yangtze's volume is greatest. Yet after running through the heavily industrialized east, the water is so polluted as to be prohibitively expensive to treat.

The central leg has been even more problematic. The route, which snakes from the Han River, a tributary of the Yangtze, to Beijing and Tianjin, required engineers to both tunnel under the Yellow River and expand the Danjiangkou reservoir in Hubei province, inundating farmland and displacing nearly 350,000 people. The project's completion date has been delayed from 2010 to 2014, partly because concerns about environmental damage to the Han River have led authorities to consider diverting water to the Han from the Three Gorges reservoir on the Yangtze.

Critics say these diversions threaten to turn the mighty Yangtze into another Yellow River, which has been crippled with pollution and reduced to a trickle. Around 70% of the Yellow River's volume is now siphoned off before it reaches the sea. Environmentalists worry that reducing the Yangtze will exacerbate pollution and cause saltwater to flow back up the delta, worsening the already-poor water quality of Shanghai and other cities.

"The project has led to a lot of heated debate," said Chen Haowen, a manager at consultancy Frost & Sullivan. "It provides only temporary relief for water problems in China and it also causes unavoidable ecological and social problems."

But despite the huge costs involved, many Chinese continue to see the construction of the eastern and central routes as essential. After all, worsening water shortages also require sacrifices: The Asian Development Bank estimated in 2010 that water shortages drive 400,000 Chinese from their homes annually.

"It does create some environmental problems, but from a comprehensive perspective it's very necessary," said Guo Youzhi, secretary general of industry group China Desalination Association.

WEALTH OF WATER
China's major rivers and the North-South Water Diversion

Journey to the west

It is the project's final route that is the most difficult and the most controversial. Because the western route requires pumping stations and tunnels to be built through mountain ranges at an altitude of 3,000-5,000 meters, it is not expected to begin construction until 2020 or be completed until 2050. Environmentalists protest that the western leg will cause the most damage of the three routes, since it draws water from the small, upstream tributaries to the Yangtze.

The project has also become the focus of criticism abroad. Some Indian officials claim that Beijing plans to link the western leg with the headwaters of the Brahmaputra River on the Tibetan plateau, thereby lessening the volume of water that flows into India and Bangladesh. Some argue Beijing already has: "I strongly suspect that China has started diverting the Brahmaputra or that it has built a dam to block the flow of the river," Tako Dabi, the home minster of Arunchal Pradesh, a disputed region at the Indian border, told Indian press on March 1.

There is no evidence that Beijing plans to pursue such a diversion, but it has certainly considered it. Officials in the People's Liberation Army have discussed diverting waters from Tibet since the 1980s. In 2005, a PLA officer named Li Ling published a book entitled "Tibet's Waters Will Save China" which argued for channeling water from the Yarlung Tsampo northward to the Yellow River, a process that would entail blasting 56 kilometers of tunnels through six mountain ranges, potentially with controlled nuclear explosions. Never easily daunted, the Chinese government reportedly bought and circulated 10,000 copies.

Most Chinese now say Li Ling's ideas have been discredited as difficult to implement, damaging to the environment and potentially catastrophic to China-India relations. "That was some kind of proposal raised by some Chinese experts, but I don't think the Chinese government is going to adopt this," said Zhao Gancheng, senior fellow and director of South Asia Studies at the Shanghai Institute for International Studies. "Building a dam is one thing, and changing the direction of the water is another."

Yet India remains deeply suspicious, partly due to claims made by Brahma >>

NO SMALL TASK: Workers on the North-South Water Diversion project celebrate after tunneling under the Yellow River

Imagine china

Big business: Inside China's water-industrial complex

Few countries would be capable of projects such as the Three Gorges Dam or North-South Water Diversion. Others would not consider them. In the US, more large dams are now being decommissioned than being built, often for environmental reasons.

Yet China is already the world leader in water-related infrastructure, and its investments continue to grow. The country is home to nearly half of the world's 45,000 large dams. As profitable opportunities within China diminish, companies have begun to export their expertise abroad, especially to Southeast Asia and Africa.

China's water-related businesses and bureaucracy have become a major force propelling projects, as they work to perpetuate their own success and relevance

China's preference for large, structural solutions stems from both political and institutional priorities. These projects were an important part of modern China's early political history, since they fit neatly into the narrative of the greatness of socialism. Both the North-South Water Diversion and the Three Gorges Dam had Mao Zedong's blessing – always valuable criteria for advancing political goals in China.

Later generations of leaders have been technocrats who also favor engineering solutions. China's current president, Hu Jintao, is a trained hydraulic engineer and a former employee of dam construction company Sinohydro. Hu is also the author of scientific development, a guiding Party notion that professes a quasi-religious faith in science and engineering.

Scientific development has contributed to the rise of a strong core of engineering-related businesses. China's powerful state-owned utilities, Huaneng, Huadian, Zhongdiantou, Guodian and Datang, employ tens of thousands of people, and their top executives rank as vice ministers. Tashi Tsering, a prominent Tibetan author, argues that China's water-related businesses and bureaucracy have become a major force propelling infrastructure projects, as they work to perpetuate their own success and relevance.

Mixed blessing

China's dams have brought big advantages, namely offsetting billions of tons of carbon emissions each year. Hydropower met a stunning 16% of China's total energy demand in 2010, and the country is on track to nearly double hydropower generation in the next decade. The reservoirs created by these dams provide drinking water for a multitude of Chinese cities.

Even so, dams and diversion projects should be weighed against approaches like reducing pollution and waste, which can be cheaper and more effective, said environmentalist Yu Chaoping. "A comparable investment in more water-efficient industrial practice, more water-efficient household appliances, and, above all, the use of more-efficient irrigation practices would likely yield more water [than the North-South Water Diversion]," Yu wrote.

Conservation is inherently cheap, and saving money is powerful motivation. But judging from the proliferation of water infrastructure, this may not be enough to compete with vested interests. ◆

Uneasy peace: China confronts the elephant next door

China and India possess one of the world's most important yet malnourished bilateral relationships. While cross-border trade between the countries doubled nearly 20 times over the last decade to reach US$73.9 billion last year, exports to India represent just a fraction of China's global total.

Meanwhile, cross-border investment between China and India is virtually negligible. Only 0.05% of China's outbound investment goes to India, and India's investment in China is even smaller. National security concerns are often grounds for rejection, as was the case for Chinese telecom firms Huawei and ZTE. "We are still suspicious of Chinese investment in India," Indian environmental minister noted in 2010.

Add to this tension a long-simmering border dispute, which flared into a one-month war in 1962 over their shared Himalayan claims. India and China continue to have intermittent spats over land, and both are building up military forces along the border.

"I think the boundary issue is not going to be solved soon. That's my personal view," said Zhao Gancheng, director of South Asia Studies at the Shanghai Institute for International Studies. "On the other hand, to keep peace in the area is a common political view and the two governments are determined not to let the boundary issues affect China-India relations as a whole."

Feed the beast

There are strong reasons to strengthen India and China's anemic relationship. The countries together have roughly 40% of the global population, giving their cooperation a huge potential to shape the future of global trade. Closer ties will also be instrumental in helping to ensure regional stability in South Asia, especially as it pertains to Pakistan.

"I think there's a high probability that over the next three four decades the India-China relationship will be very important, possibility as important as the US-China relationship today," said Pieter Bottelier, a professor of China studies at Johns Hopkins' School of Advanced International Studies.

Many Chinese still frown upon the term "Chindia," arguing that India's perennial poverty problems and inefficient governance render it a poor choice for China's partnership

Chinese officials have taken some steps toward improving relations with India. In January, for example, China's ambassador to India, Zhang Yan, urged his countrymen to put aside "historical issues" and cooperate in expanding bilateral trade to US$100 billion by 2015.

But some Indians continue to be deeply suspicious of China. Critics have plenty of fodder: India's growing trade deficit with China, border disputes in the Himalayas and conflicts over the Brahmaputra River. China is also purportedly the major obstacle to India gaining a permanent seat on the UN Security Council.

Meanwhile, India rarely makes headlines in Chinese media. Many Chinese still frown upon the term "Chindia," for example, arguing that India's perennial poverty problems and inefficient governance render it a poor choice for China's partnership. Unfortunately for both Beijing and New Delhi, these unflattering perceptions will be hard to defeat. ◆

>> Chellaney. In his book "Water: Asia's New Battleground," Chellaney cautions that water diversion projects in Tibet would proceed the way China's mineral-wealth-exploitation strategy has been implemented in the region – quietly. Chellaney noted that state-owned companies have quietly built dozens of dams on the upper Mekong, Irrawaddy and other international rivers.

Opponents in downstream countries complain these dams reduce water flow in times of relative scarcity and damage river ecosystems. The Brahmaputra is the most visible flashpoint, but Kazakhstan, Cambodia, Laos, Thailand and Vietnam have all grown more vocal in their criticism of China's damming and diversion of international rivers.

These countries have little recourse. International law does not yet provide water rights for downstream countries, and China has refused to accept full membership in institutions aimed at resolving water disputes, such as the Mekong River Commission. China signed an agreement with Kazakhstan on water quality in the Irtysh River in February 2011, but that came only after decades of negotiation.

Yet while China can lawfully ignore the complaints of downstream countries, it may be politically disastrous to do so. As water grows scarcer in Asia, these disputes could trigger conflicts – especially if dams and water diversion projects disrupt ecosystems and impoverish farmers downstream, as critics say they will.

On the shoulders of giants

As water in China and neighboring countries grows scarcer, massive water infrastructure projects may be losing their logic. Diverting water alleviates shortages, but it cannot fully meet demand, and it may have adverse effects on other ecosystems and communities.

"Looking ahead, we can still try to buy some more time by building all these massive diversion projects," said Ma Jun, the author of "China's Water Crisis." "But I believe that will not be the solution, because it can't even fill out the current gap, let alone meet the rising demand in the future. We have to recognize we have almost reached a limit in our expansion of supply and now it's high time for us to shift our focus to conservation."

Governments are now resorting to incredibly energy-intensive methods to keep the water flowing: pumping it from deep aquifers, transporting it from far

away, and treating and desalinating it. The true cost of these projects is hidden from consumers. Governments subsidize construction of facilities, while social and environmental costs often go unrecorded.

Because this hard-won water is priced so cheaply, much of it is simply wasted. Agriculture accounts for a staggering 70% of water use in China, but analysts estimate that more than half of the water used for irrigation is lost before it reaches the field due to old, leaky irrigation systems. Farming methods are also to blame: Chinese farmers typically flood their fields rather than using more efficient drip irrigation, said Jon Galligan, an analyst at CLSA.

Finally, Beijing continues to subsidize the cultivation of water-intensive grains such as wheat and corn in the arid north – creating a mind-boggling situation in which southern China exports water to the north so that northern China can export water-intensive food to the south.

The industrial sector also renders a huge volume of water useless. About one-third of industrial waste water and more than 90% of household sewage in China is released into rivers and lakes without being treated. For this reason, Ma argues that the starting point for China has to be pollution control. "If we still discharge all this waste into our water ways, then we can't talk about re-using or recycling water, because those discharges will destroy whatever limited water resources that we have," he said.

A cautionary tale

Beijing recognizes the economic and ecological sense of preserving its water. Conservation was the focus of last year's No 1 document (the first policy recommendation issued by the State Council) and was stressed in the 12th Five-Year Plan for Water. Together, the documents pledged investment of US$634 billion in water conservation over the next decade.

Beijing has set useful policies at a federal level, for example, requiring local governments to invest 10% of revenues from land sales in irrigation. But Kenneth Lieberthal, director of the John C Thornton China Center at the Brookings Institution, argues that China's environmental problems originate not in policy but in implementation: "...much of the environmental energy generated at the national level dissipates as it diffuses through the multi-layered state structure, producing outcomes that have little concrete effect," Lieberthal writes.

One major obstacle is the way water policy is governed – currently, by six separate agencies that reportedly fail to cooperate on various aspects of management. An even bigger complication is that local environmental regulators are beholden not to national regulators but to local officials, who continue to be evaluated primarily in terms of economic growth.

Many claim that China will inevitably clean up the inefficiencies and waste of its own industrial revolution just as the US and Europe have done. China came late to its industrial revolution, they say, and its people deserve a chance at the same wealth and opportunity.

That may be true, but unfortunately for China, it appears to be running out of time, said Peggy Liu, the chairperson of non-profit environmental organization JUCCCE, "Americans think this is a Chinese issue, but it's not. It's a natural stage of development. But it's also true that the world today can't really afford China to be going through this."