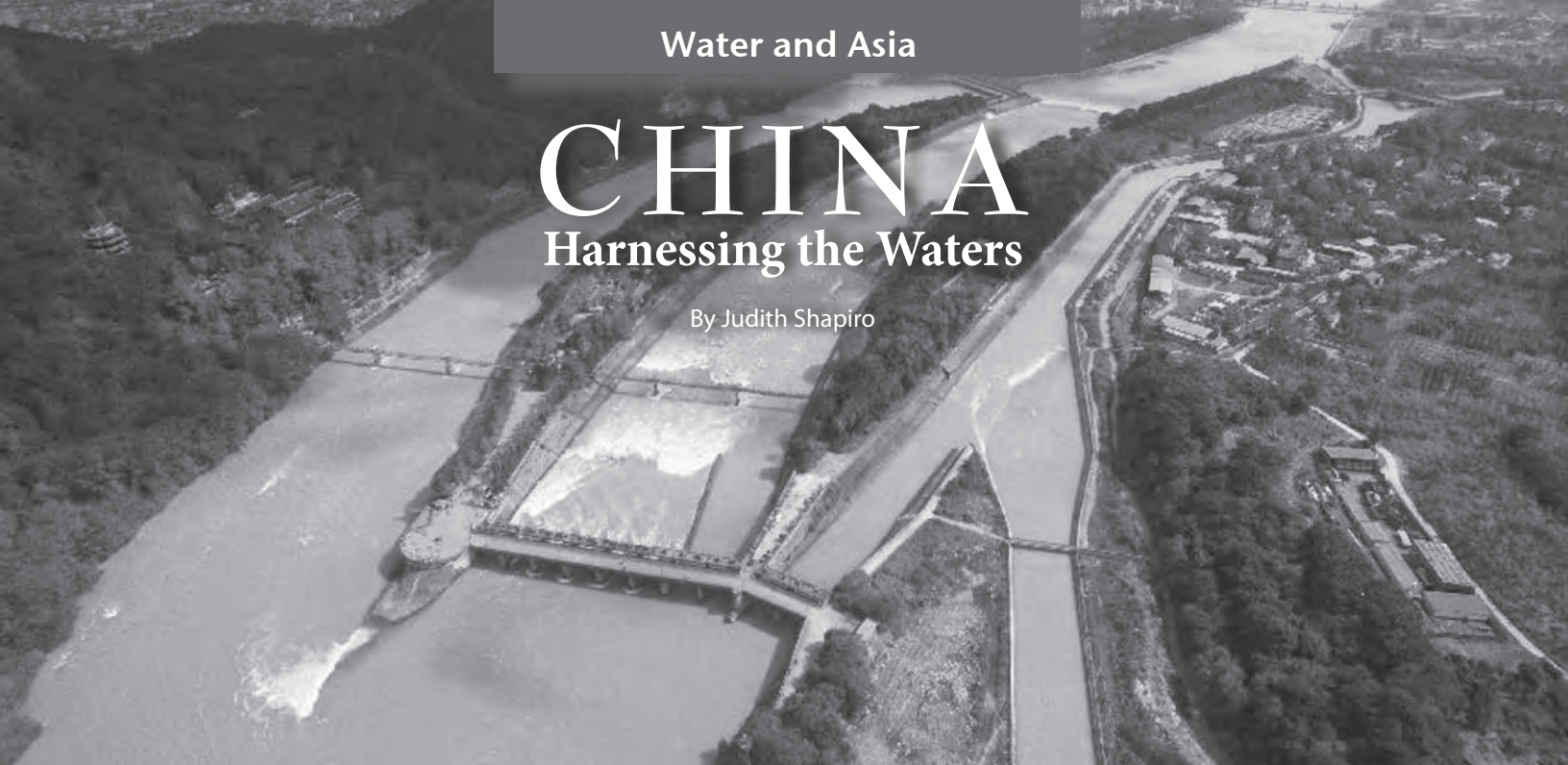


CHINA

Harnessing the Waters

By Judith Shapiro



Aerial view of the Du Jiangyan irrigation system, which has been serving the Sichuan region for more than 2,000 years. Source: *Xinhuanet News Agency* website at <https://tinyurl.com/yde37o4u>. Photo: Xinhua/Li Qiaobao.



Han dynasty depiction of Yu the Great. Source: *Wikimedia Commons* at <https://tinyurl.com/y767bv6r>.

China is defined by its two great rivers. The Yellow and the Yangzi (Yangtze) Rivers flow from the Himalayas, known as the water tower of the world, for thousands of miles, all the way to the East China Sea. China's national identity has been shaped by the struggle to control these rivers, which are prone to drought and flood. Fear and control are the great themes of life around these two rivers, and human efforts to cope with their unpredictability may have helped China form into the enormous country that it is today. Indeed, the mythological first Chinese emperor, Yu the Great, is known for harnessing the waters. Every Chinese schoolchild knows the story of how Yu tamed the raging flood.

Legend tells us that the Yellow River Basin suffered from serious flooding all year-round. The father of Yu the Great was named to lead the flood control efforts. He tried hard substances to create banks to block the flood, but they did not work. After nine years of failure, Yu the Great took over his father's struggle, walked through the mountains and rivers in central China with measuring tools, and realized that blocking the floods would never cure the problem. He changed strategy from blocking to dredging. Yu understood that the way to prevent floods was to work with the water's characteristics to dig canals and expand narrows so the water might flow safely to the sea. During thirteen years of work on flood control, Yu sacrificed himself completely. He said goodbye to his wife after the fourth day of their marriage and even passed his home three times but did not have time to go inside. Chinese people still tell stories of this sacrifice and remember Yu's skill and patriotism. To some extent, China's leaders today are still judged by their ability to harness the waters.

Chinese waterways were not only a source of flood and drought. They were engineered into great irrigation works as early as the third century BC. If you visit Sichuan Province in western China, you can see Du Jiangyan, ancient waterworks that still function today. Du Jiangyan is located on the Min River, a major tributary of the Yangzi. It was built by Li Bing, the

governor of what was then known as the Shu region. The Du Jiangyan network of canals and diversions takes full advantage of the physical features of the region. The terrain is high at the northwest part of the irrigation system and low at southeast, so the waters are harnessed without constructing dams. Du Jiangyan has been serving the Sichuan region for more than 2,000 years, and, according to popular belief, it successfully changed the whole basin into a land of abundance and prosperity.

Construction began on the fabled Grand Canal, which links the Yellow and Yangzi Rivers, as early as the fifth century BC and was completed during the Sui dynasty (581–618 CE) at a length of more than 1,100 miles. Shipping along the canal played an important part of economic life in early China. Beginning in the thirteenth and fourteenth centuries, the Grand Canal was the primary route for grain and other commodities from south China to reach the capital city that would become Beijing. Although the canal eventually fell into disuse and disrepair, today it is being given new life, about which more is below.

The Yellow River, which traverses the North China Plain, home of China's earliest civilization and its ancient capital in Xi'an, is also known as "China's sorrow." Unlike the south, which often has too much water, north China is chronically water-starved, as the Yellow River gives either too much or too little. It is even famous for being a weapon of war: In 1938, Kuomintang General Chiang Kai-shek deliberately broke a dam in order to try to repel the Japanese. The great deluge failed to stop the invaders, but almost half a million innocent Chinese farmers drowned because they were not warned to get out of the way.

When Chinese Communist Party Chairman Mao Zedong took power in 1949, he too dreamed of harnessing the waters, like the emperors before him. He wrote a famous poem about the great wall that could arise across the Yangzi River. Although China did not yet have the capacity to build the Three Gorges Dam, the country built other dams, large and small. Among them is the Three Gate Gorge Dam (Sanmenxia) on the Yellow River, begun in 1957. Hydroengineer and Professor Huang Wanli, a graduate of Cornell University and the University of Illinois Urbana-Champaign, warned that it was a poor idea to dam the main stream of a great river, especially one prone to carrying heavy, muddy silt like the Yellow River. At that time, Mao labeled many educated people who opposed his policies as "Rightists." Huang was among them, and in 1957, he was humiliated,

Water and Asia



China map with overset photos of the Yangtze River (left) and Yellow River (right). Source: All images © Shutterstock.

LAKES WERE “ATTACKED” IN A “WAR AGAINST NATURE,” AND WETLANDS WERE FILLED IN WITH ROCKS AND SOIL.

silenced, and sent to a labor camp. As he predicted, the dam was useless for flood control and electricity production, and it silted up in a short time. Huang continued to oppose the construction of dams that he thought were too big after he was rehabilitated and his reputation restored. He died at the age of ninety-four while writing articles against the construction of the Three Gorges Dam.

Political campaigns like the 1957 Anti-Rightist movement and the 1958–1960 Great Leap Forward, which tried to industrialize China almost overnight, contributed to the three-year Great Famine in which an estimated thirty million people died. Mao was forced into semi-retirement. It was no accident that he chose to announce his vigorous return to the political stage with a swim in the Yangtze River in July 1966. In effect, he was announcing that he still had the political power to harness the waters. The 1966–1976 Cultural Revolution, an even greater upheaval than earlier campaigns, included nationwide efforts to increase China’s arable land. Afraid of war with the USSR and the US, China’s leaders felt globally isolated and afraid of another famine. Lakes were “attacked” in a “war against nature,” and wetlands were filled in with rocks and soil. These efforts failed to create more farmland because the soil was too wet, and at the same time, they destroyed valuable ecosystems.¹

Modern Challenges

Mao died in 1976, and with the arrival of the economic reforms and prosperity of the post-Mao era, China finally built the Three Gorges Dam of which he had long dreamed. The dam traverses the Yangtze River at a site between the megacities of Chongqing upriver and Wuhan downstream (Shanghai sits at the river’s mouth). Completed and operational by 2012, the dam is the world’s largest power station in terms of the energy it generates, with a capacity of 22,500 megawatts. But the dam has been riddled with controversy. The newly created basin inundated the steep gorges that were among China’s most famous landscapes, destroyed ancient archaeological sites, interfered with the biodiversity and general ecology of the



Above: The Three Gorges Dam. Source: Wikimedia Commons, photo by Le Grand Portage, at <https://tinyurl.com/y8bcnuv>.

Left: Professor Huang Wanli. Source: China Media Project website at <https://tinyurl.com/y984t8kh>.



1967 commemorative poster of Chairman Mao's swim in the Yangtze. Translation: "Commemorate the first anniversary of Chairman Mao's swim over the Yangtze—Follow Chairman Mao in moving forward in wind and waves!" Source: Chineseposters.net at <https://tinyurl.com/ychdc2y6>.

river system, caused the relocation of 1.3 million people whose traditional river transport culture vanished when they moved, and created problems with pollution, landslides, and sedimentation in the slow-moving waters above the dam. Below the dam, reduced sedimentation creates risks as far away as Shanghai, which is vulnerable to climate change-induced sea level rise and now also faces a reduction in the rate of replenishment of the soil on which it rests. Moreover, the Three Gorges Dam rests on a seismic fault, raising questions about what would happen to the millions of people living downstream in the event of a large earthquake.

Readers may want to access Andrew McGreevy's quite favorable review of Professor Shapiro's book *China's Environmental Challenges* that appeared in the fall 2013 issue of *EAA* on the AAS website at <https://tinyurl.com/y7s9ebqw>.

The Three Gorges Dam is only the most well-known among hundreds of other large dams intended to provide electricity and flood control. China needs a huge amount of energy to fuel its enormous economy. Unfortunately, the growth associated with becoming the manufacturing hub of the world has led to intense pollution—of air, soil, and water. Today, even official government sources acknowledge that two-thirds of Chinese cities face water shortages, 280 million people have no access to safe drinking water, one-fifth of urban water sources do not meet basic water-quality standards, and more than 80 percent of China's underground water is classified as being of such bad quality that it is not even suitable for agricultural use.² Water used for irrigation eventually sends chemicals into the food



Aerial view of the Three Gorges Dam—the world's largest hydropower plant. Source: *IFS* website at <https://tinyurl.com/y9w9bdky>.



Baiji, also known as the Yangzi River dolphin. The baiji was declared extinct in December 2006. Source: *Sixth Tone* website at <https://tinyurl.com/y75wogte>.

supply, as occurred when cadmium, a heavy metal, was discovered in rice produced in Hunan Province, one of China's richest agricultural regions.³

There are many famous cases of water pollution and industrial accidents, such as the Songhua River benzene spill in 2005. Benzene is a potent carcinogen, and residents of the northern city of Harbin had to drink trucked-in bottled water after authorities alerted them, days after the spill occurred. Another famous case is that of Lake Tai near the Yangzi delta, which is chronically prone to algae blooms. The millions who rely on it for their livelihoods cannot trust the water; they too often have to drink bottled water. Another accident involved the March 2013 death from disease of 16,000 pigs near a river that feeds the Shanghai water supply. The carcasses were dumped into the river, providing poignant images of what can happen when a few people disregard government regulations in order to save money and cause great harm to large numbers. Fish and aquatic mammals cannot live in toxic waterways; the Yangzi (*Baiji*) River dolphins became extinct in the past decade, a victim of pollution.

Climate change is making the Chinese government's challenge to govern the country's waterways much greater. Water-related impacts include sea level rise, which threatens the great cities of Shanghai, Guangzhou, and Dalian on the east coast; melting glaciers in the Himalayas, which in the near term create too much water and flooding, but in the long term will further deplete the aquifer under the North China Plain and threaten the already-water-deprived population of Beijing with the possibility of becoming "climate refugees"; and even more of the floods, droughts, and cyclones with which Chinese officials have struggled for millennia. Fortunately, the Chinese government understands these risks and is taking a leading role in the global effort to curb carbon emissions. China is the world's leading supplier of solar panels and wind turbines, and is taking strong steps to "peak" and even reduce the country's coal consumption.⁴



South-to-North Water Diversion Project central route starting point in Xichuan County, Nanyang, Henan. Source: *Wikimedia Commons*, photo by Nsbdcg, at <https://tinyurl.com/yab3bvbz>.



A graceful bend in the Nu River. For now, activist groups have stopped planned dam construction on the Nu River in China. Source: © Shutterstock.



Tiger Leaping Gorge, Lijiang City, Yunnan Province, China. Source: © Shutterstock.

COURAGEOUS JOURNALISTS AND CITIZEN ACTIVISTS HAVE USED CHINA'S EXCELLENT ENVIRONMENTAL LAWS TO HOLD LOCAL OFFICIALS ACCOUNTABLE.

Today, the Chinese government has made “harnessing the waters” a central part of its public policy efforts, building major engineering projects like dams and canals. The controversial South-to-North Water Diversion Project brings water from the Yangzi River to the water-starved North China Plain. The eastern route has reopened and repaired the old Grand Canal through Jiangsu, Hebei, and Shandong provinces, including parts that date to the fifth century BC. The middle section, completed in 2014, serves Henan, Hebei, Beijing, and Tianjin. The proposed western route, which would go through mountain areas and be the most environmentally damaging, is still in planning stages.

Although the project decreases the likelihood of flooding in the south and drought in the north, the ecology of the Yangzi River Basin has been affected. Moreover, the resettlement of inhabitants is a huge challenge for the government. In response to the construction of the central route, Henan Province had to move approximately 162,000 residents. As is often



An angry woman blames the polluted stream and well water for the illness and death blighting her village, Zhangyuzhuang, in Henan Province. The cluster of paper and chemical factories about 15 km upstream is discharging polluted wastewater into the stream used by the villagers. Source: “Water Pollution in China,” from Greenpeace at <https://tinyurl.com/17rk4sy>. © Lu Guang/Greenpeace.



2011 Greenpeace “Detox” action in Beijing at a Nike Store. As a result of an investigation into toxic water pollution by textile companies in China, protests like this were held at stores that carried clothing brands manufactured by companies that were known polluters. Source: © Greenpeace.

the case in such mega-projects, officials have had trouble finding suitable places for relocation and offering adequate compensation. Moreover, there are problems with water quality, and farmers who used to count on being able to irrigate their fields now see their precious water pumped northward. Some think that rather than building its way out of its water problems, China should focus on consumption, promote water conservation, increase fines for water polluters, and work with the rhythms of the rivers, just as Yu the Great and Li Bing did with their more natural approaches.

The People's Response

The Chinese people are unwilling to see their landscapes destroyed by big dams and their drinking water tainted with chemicals. An increasingly well-educated middle-class population understands that many toxins have no taste or smell. Some will travel for hours to fill their water jugs from a trusted mountain spring. Anti-dam activists work in China's far western regions to preserve the livelihoods of people who will be displaced by planned dams and try to save magnificent landscapes such as those created by the Nu River near the border with Myanmar. Civil society groups called environmental non-governmental organizations (ENGOS) have labored to plant trees in areas where the desert has expanded, pick up garbage along river banks, and educate farmers about the appropriate use of pesticides and fertilizers that pollute watersheds through what is called “non-point source pollution.” Courageous journalists and citizen activists have used China's excellent environmental laws to hold local officials accountable:

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Screen capture from *Alibaba's Jack Ma Spirited Speech on Smog, IT, Pandas and More*—his speech at the 2015 United Nations Climate Change Conference in Paris.
Source: YouTube at <https://tinyurl.com/yb4azuou>.

For example, they have used the requirement to conduct environmental impact assessments to great effect, stopping a planned dam at the famous Tiger Leaping Gorge in Yunnan Province.⁵ Groups like Greenpeace-East Asia take water samples where citizens have reported concerns about factory wastewater polluting their villages. If laboratory analysis discovers potent toxins in the water, they launch campaigns to “name and shame” the polluters. Their very successful “Detox” campaign forced many athletic shoe and clothing companies to stop dumping dyes and other chemicals into the Yangzi River. Another prominent group, the Institute of Public and Environmental Affairs (IPE), has pressured the government to make more of its data about pollution available, and it has used that data to create smartphone apps that allow ordinary citizens to know what is in their water and air. These “transparency politics” empower the people to demand that local officials and factory managers change their ways, especially when so often such pollution violates the law.

An interesting development is the participation of corporations in support of ENGO efforts. The Alibaba Foundation, under billionaire Jack Ma, has been helping Chinese civil society groups and ordinary people monitor their water. Ma is creating 2,000 “folk river chiefs” to work with government-appointed river monitors so as to engage a cross-section of public and governmental groups to help push for information transparency and clean up China’s waterways.⁶

Despite these encouraging developments, it is not easy for ordinary villagers to fight powerful political and economic interests, especially when a factory that pollutes their water is in league with those who are supposed to implement the laws. Some villagers are uneducated, even illiterate, and it is very difficult for them to close a factory. A short documentary called *Warriors of Qiugang* tells the story of a village in Anhui Province, where the villagers are falling ill from chemicals discharged by a pesticide and fertilizer factory, and cancer rates are high. Children’s skin is itchy; peaches and wheat are poisoned. The villagers are unable to fight the thugs who run the factory, despite their use of standard procedures like petitions to the local environmental protection bureau and even lawsuits. Only when an ENGO comes to support one brave farmer-leader and the media publicize the case does the central government pressure local leaders and shut down the factory. Even then, through a dynamic that environmental scholars call “the displacement of environmental harm,” the factory moves a few miles away to an industrial park. As we all know, water flows into other water, so what happens upstream eventually comes downstream. Moreover, the factory merely abandoned its toxic waste, and the villagers continue to grow ill and die.

The Chinese government understands that its legitimacy rests at least in part on its ability to clean up China’s environment. “Harnessing the waters” now implies cleaning them up, for the emerging middle class has lost

FARMERS, FACTORIES, AND CONSUMERS WILL CONTINUE TO STRUGGLE AGAINST ONE ANOTHER FOR A CHANCE AT EQUITABLE USE OF CHINA'S WATER.

patience with foul air, unclean drinking water, and contaminated food. Socially destabilizing “environmental mass incidents” are increasingly common. To avert the threat of disorder, the central Chinese government now prioritizes environmental protection through the Communist Party’s new guiding principle of building an “ecological civilization.” The Ministry of Environmental Protection’s status and power are increasing. Penalties for pollution are increasingly severe. Since the passage of the January 2015 set of stronger environmental protection laws, citizens’ groups have been empowered to bring public interest lawsuits against polluters, and environmental courts are starting to fill. More environmental inspectors are being hired and empowered to shut down factories that violate standards. Incentives for local officials to place economic growth above environmental protection are being weakened, and officials will now be evaluated on environmental measures as well. But the “implementation gap” remains large, as local leaders find ways to bend the rules and local entrepreneurs put profit above public health.

China has a long way to go before its rivers run clear and its lakes are again swimmable. Farmers, factories, and consumers will continue to struggle against one another for a chance at equitable use of China’s water. In coastal areas, where freshwater runs to the ocean, red tides or algae blooms will continue to threaten China’s already-overfished coastal waters and the fragile remaining wetlands where migratory birds stop to rest. China’s global reputation will remain that of a highly polluted country where residents and even tourists must take steps to safeguard their health with the help of facemasks, bottled drinking water, and smartphone pollution apps. However, for those who care to look deeper and remember, landscape paintings and the ancient names of streets and villages will testify to the deep connection between people and nature once embodied by traditional Chinese culture, a connection that can yet be nurtured and revived. For those willing to listen, nostalgic elderly Chinese will recall the huge fish they used to catch in the rivers and lakes, and the splendid birds that used to live in green forests and blue skies. Working together, the Chinese can yet realize the dream of a beautiful homeland. ■

NOTES

1. Judith Shapiro, *Mao’s War Against Nature: Politics and the Environment in Revolutionary China* (Cambridge: Cambridge University Press, 2001).
2. See “China Government Reports,” *China Water Risk*, accessed July 19, 2017, <https://tinyurl.com/y9xrrogx>.
3. Chris Buckley, “Rice Tainted with Cadmium Is Discovered in Southern China,” *The New York Times*, May 21, 2013.
4. See “Fact Sheet: US-China Joint Announcement on Climate Change and Clean Energy Cooperation,” from the White House website archives of the Obama administration, last modified November 11, 2014, <https://tinyurl.com/y9cujs7m>.
5. A good film about dams and activism in western China is *Waking the Green Tiger* by producer and director Gary Marcuse (Face to Face Media, 2011).
6. “Alibaba Joins Efforts to Protect Water Resources,” *Xinhuanet*, last modified April 9, 2017, <https://tinyurl.com/ybwg4n72>.

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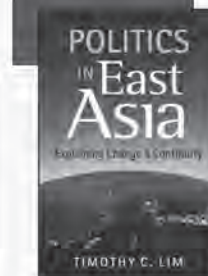
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