

Building a Dam for China In the Three Gorges Region, 1919-1971

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In the early twentieth century, Chinese leaders began to contemplate building a large dam on the Yangzi River that would generate electricity, boost river transport, and end its history of floods. They paid particular attention to the Three Gorges region, where the river ended its descent from the Sichuan Basin into Hubei province's Jiangnan Plain. This chapter examines Chinese efforts to construct a dam near the Three Gorges between 1919 and 1971. It concentrates on this block of time, because the first dam proposal appeared in 1919, and the Gezhouba Dam became that place in 1971. Past scholarship has overlooked this period and focused on the building of the Three Gorges Dam (TGD) in the 1990s (Dai, 1998).

I take a different tack and trace the Chinese government's aspiration to make a TGD to a new understanding of technology's power precipitated by Western imperialist pressures in the mid-nineteenth century. Prior to Western imperialism's arrival, elites in China did not take the rapid expansion of technological power as a primary economic goal (Wong, 1997; Elvin, 1973). This changed when Western imperialists and their scion – Meiji Japan – used technological strength to assert influence over East Asia. In response, elites in China embraced the Western notion that technological self-strengthening was central to a country's economy and that its territory was a repository of resources useful for industrialization (Halsey, 2015; Wu, 2015; Pietz, 2014).

After laying this historical groundwork, the chapter highlights three defining features of Chinese efforts to erect the TGD. First, Chinese elites manifested a belief in the national benefits of technologically redesigning the environment of the entire Yangzi region. Second, Chinese leaders acted like nationalist elites in other late developing countries and advocated using state power to advance industry (Gerschenkron, 1962: 5-30). Third, Chinese elites repeatedly sought out foreign assistance to offset domestic shortages of industrial capital. These three trends engendered two approaches to technology, or what Thomas Hughes (1983) calls technological styles, which reflected different understandings of how to use experts, labor, and capital.

The first approach is apparent from 1919, when Sun Yat-sen – the founder of China's first modern mass Party the Guomindang (GMD) – initially suggested a dam in the Three Gorges

region. For Sun, the dam was a technocratic affair in which technical experts knew best how to make the Yangzi River contribute its aqueous power to strengthening the national economy. It is not surprising that the GMD followed Sun's technocratic approach, when it worked alone on preparatory work for the dam in the 1930s and with the United States in the 1940s. Previous studies have well established that the GMD shared the global penchant of many mid-twentieth century regimes for technological solutions to national problems (Kirby, 2000; Scott, 1999).

It is more noteworthy that this technocratic trend persisted after the Chinese Communist Party (CCP) defeated the GMD in the Chinese Civil War in 1949 and allied the People's Republic of China (PRC) with the U.S.S.R. against the U.S. in the Cold War, since much scholarship has argued that the CCP under Mao (1949-1976) put greater stress on political goals than technical expertise (Lee, 1990; Goldman, 1981). This was not entirely the case with the TGD. Similar to some other high priority projects, Chinese and Soviet experts had significant influence over decision-making (Lewis and Li, 1991). Experts' authority waned during the Great Leap Forward (1958-1962) and the late 1960s, when Mao advocated an alternate technological style that was rooted in the Maoist idea that will power and mass mobilization were more powerful contributors to national development than technical proficiency and advanced technology (Riskin, 1987).

Western Imperialism and New Visions of Power

In the Opium War (1839-1842), the British Empire deployed ironclad steamships against China's last dynasty – the Qing. The British routed Qing troops and through unequal treaties obtained authority over parts of Chinese political and economic affairs. In subsequent years, Western imperial powers repeatedly used their technological superiority to exact concessions from China, including the right for British warships to patrol the Yangzi. Starting in the 1860s, regional officials, such as Zeng Guofan and Li Hongzhang, pushed to increase industry in the Self-Strengthening Movement to counter Western pressures. There has been much debate about whether the government's industrialization attempts were a robust rejoinder to the Western challenge or an inept retort of a sclerotic regime (Elman, 2004; Feuerwerker, 1958). Either way, state-led efforts at industrial expansion marked an important shift in Chinese economic statecraft.

For millennia, Chinese elites viewed agriculture as the economy's foundation. The political salience of this age-old principle eroded in the face of imperialist threats, which gradually made the Chinese intelligentsia think that if a country did not bolster its technological power, it risked an end to its history as a sovereign state. As elites gave industry more economic prominence, they came to see that the economy's energy base could no longer primarily consist of recently deceased plant matter *and* human and animal labor (Von Glahn, 2016: 348-399). China had to uncover other materials within its territory to power industrial growth.

Like elsewhere in the world, Chinese industrial boosters in the nineteenth century took coal to be the main new form of energy (Kander and Malamina, 2014: 131-248). To expand the domestic supply, regional officials fostered coal mining, and geologists mapped out coal deposits (Wu, 2015; Wright, 2009: 15-114). After hydroelectric power's invention in the 1880s, some Chinese considered dams as another way to generate energy. One of hydroelectricity's earliest proponents was Sun Yat-sen. In 1894, he wrote a letter to Li Hongzhang – a leading light of the Self-Strengthening Movement – in order to bring hydropower to his attention.

Sun's letter does not appear to have had any policy consequences. It however raised ideas about dams that would remain dominant themes in Chinese dam building. First, the government should promote hydropower development. Second, dams were economically advantageous, because they facilitated river transport and provided limitless energy for economic activities. Third, hydropower plants were a valuable supplement to coal, since they were a sustainable source of power, and electricity was transmittable to carbon-poor places (Yang, 2005: 19-20).

Imagining an Industrial China

In 1911, the Qing dynasty collapsed, and China broke up into competing warlord regimes. Amidst this fraught atmosphere, Sun formulated schemes to make real his dream of an industrial China. He made his most grandiose proposal in 1919 in *The International Development of China* (Sun, 1922). In the book, Sun acted like other nationalist visionaries in late industrializing countries: he laid out a plan to quickly endow China with a broad industrial base (Kemp, 1983). Sun knew that China did not possess the funds, machinery, or

technical knowledge to independently industrialize. So, he called on Westerners to offer their technical expertise and presented investment opportunities.

Sun focused on the creation of nationwide industrial systems, such as transportation and communication infrastructure, that reached from China's far west to blue-water ports on the Pacific. Foreign investors could also bankroll new mining, manufacturing, and energy-producing facilities countrywide. In so doing, China would gain an industrial apparatus whose products spanned the gamut from raw materials to complex machinery (Sun, 1922). One project Sun mentioned was the Three Gorges Dam. In his view, the dam's main economic benefits were its immense output of electricity and stimulation of river traffic (Sun, 1922: 73-74). In 1919, Sun also penned an editorial in which he explained that the Three Gorges was an ideal dam location, because it was narrow and sixty feet deep, and it had high stable walls capable of holding a large reservoir. The Three Gorges region had the added advantage of being located where the Yangzi concluded its 500-meter plunge from Sichuan to Hubei.

Like in *The International Development of China*, Sun envisioned the dam as part of a regional development program. The dam would be one of seven Yangzi River hydroelectric stations, which would account for a sixth of the world's hydropower. Anticipating a critique of the cost, Sun cited a foreign expert's estimates of how much the dam would save in the long run, since hydropower plants required less labor than coal mines and their associated railways (Guowuyuan sanxia gongcheng jianshe weiyuanhui, 2005: 3-4). At the time, no foreigners stepped forward to build the TGD. One likely reason is that the country was split into warlord regimes, whose competition induced a violent political environment and troubled economic climate (Sheridan, 1966). In addition, there was a shortage of demand for electricity in the region, and so if a foreign investor had paid for the TGD's high construction costs, they could not have counted on much of a return on their investment in the short- or mid-term. On the other hand, Sun's approach to the TGD foreshadowed later Chinese officials, who envisaged it as a motor for regional economic growth.

A Preliminary Survey

In 1927, the GMD reestablished a central government in Nanjing. Its hold on power was shaky, as warlords continued to exert influence, and Japan persistently sought to take Chinese territory (Eastman, 1974). The GMD nonetheless attempted to build up the national economy

using technocratic methods (Strauss, 1998; Kirby, 1984). To oversee development efforts, the GMD founded the National Defense and Design Commission (NDDC) in 1928. In the same year, the GMD set up the Yangzi River Water Management Commission. The GMD staffed these organizations with educated elites, whose pedigrees were similar to their institutional kin in other late developing states. They had studied in advanced industrial countries, such as the U.S. or Japan, or they had attended Chinese schools infused with western techno-science (Seth, 2007; Yeh, 2000).

Many of these individuals shared Sun's aspiration to strengthen China by technologically revamping the Yangzi's economic geography. The NDDC made its first salvo in this direction in 1932 amidst trying circumstances. The year before, 142,000 died in Yangzi floods, and the Japanese seized Manchuria. Then, in 1932, Japan attacked Shanghai, and the central government temporarily moved the capital inland to Luoyang in Henan province. The government's finances were also in disarray, and so the NDDC's first attempt to survey the Three Gorges was cut short. Soon after, the NDDC decided the TGD was too important to halt, and so it channeled scarce funds to a survey group (Zhonggong zhongyang dangshi yanjiu shi, 2007: 4. Wanli Changjiang zengkan, 1996: 255-256).

Over the next two years, the group engaged in extensive fieldwork (Guowuyuan sanxia, 4-8.). One participant was Song Xishang, who attended MIT and later received an Engineering Masters from Brown (Zhongguo xueshu qikan, 2017). Song summarized the group's findings in a Yangzi Commission report that evinces his cosmopolitan background. The report opens with a passage that depicts China as part of a worldwide network of hydropower experts engaged in constructing dams for the sake of nation building. Song also translates the TGD into the dominant language of global techno-science and places English and Chinese terms next to each other when discussing its main structures.

Song further evinces his support of foreign models of hydrological development, when he references the regional activities of the Tennessee Valley Authority (TVA). Song embraced the technocratic mind-set of the TVA and overlooked how the TGD would transform the ecology of the Yangzi River (Sneddon, 2015; Klingensmith, 2007; Reisner, 1986; Worster, 1985). He instead called on hydropower experts to make a unified plan that considered the economic benefits that the dam could bring to the Chinese people by improving regional transport, irrigation, and energy supplies. (Guowuyuan sanxia, 4-8).

In another report, Song and his co-authors suggested making the TGD part of a regional industrial complex made up of a large chemical plant and three other hydropower stations further up the Yangzi. Yet, they admitted that the dam was presently inadvisable, since China lacked the necessary resources. In addition, it did not make economic sense to allocate limited resources to the dam, since the economy did not need so much electricity (Wanli Changjiang zengkan, 255-258).

Partnering with the United States

After the early 1930s, the Chinese state's work on the Three Gorges project stagnated for a decade. In the meantime, another 142,000 perished in the 1935 Yangzi floods (Zhonggong zhongyang dangshi yanjiu shi, 4). During World War II, Japan occupied the nearby city of Yichang and devised plans for a TGD. Unfortunately, Japanese documentation is not available in translation, and so I will not discuss their activities further. As for the GMD, it fled to Sichuan, where the institutional descendant of the NDDC – the National Resources Commission (NRC) – endeavoured to industrialize the Southwest (Bian, 2005).

In 1942, the NRC sent experts to the U.S. to study science and technology in preparation for postwar reconstruction. The NRC assigned Berkeley-trained civil engineer Zhang Guangdou to the TVA, where Zhang heard that his former U.S. Bureau of Reclamation colleague – John L. Savage – was going to India to assist with the Bhakra Dam. Zhang suggested the NRC sponsor a follow-up visit to China, and the NRC agreed (Yan, 2016).

Once in Sichuan, Savage learned about American advisor G.R. Paschal's recommendation that China and the U.S. cooperate on the Three Gorges Dam and a large fertilizer factory, whose output could repay U.S. technical assistance. Elated at this idea, Savage went to survey the Three Gorges, accompanied by NRC members and the commander of Yangzi defenses, since Japan was known to launch attacks nearby (Yang, 26). When Savage reached the Three Gorges, a Chinese source reports he declared: "Your honourable nation's founding father Dr. Sun Yat-sen said it well, the Yangzi really is amazing. This place truly contains a huge amount of hydroelectric resources." Savage camped in the region for ten days amidst the threat of Japanese air raids and feverishly collected survey data, taking as his guide Chinese and Japanese military maps as well as U.S. Army aerial photos (Yang, 26-28; Wanli

Changjiang zengkan, 99). Savage then returned to Sichuan and wrote the first comprehensive plan for the integrated use of the Three Gorge's water resources.

Since China was at war, Savage recommended placing dam equipment underground. Savage's plan otherwise stressed the economic gains that would come from the world's largest hydroelectric plant. According to his estimates, the dam would annually generate 68.4 billion kWh and a gross income of \$143 million. It would stop Yangzi floods, bring water to over 10 million people, and irrigate over 10 million acres. This agricultural stimulus would contribute \$37 million to China's GDP every year. The dam would additionally lift annual freight traffic by 33.2 billion ton miles, reduce freight costs by \$192 million, and raise tourism earnings by \$5 million. To supervise the project, Savage advised the NRC team up with TVA technocrats and the U.S. Bureau of Reclamation (Wanli Changjiang zengkan, 114-118, 120-121).

After finishing the plan, Savage returned to the U.S. and expressed his enthusiasm for the TGD to Zhang Guangdao. Zhang thought the project was a non-starter and voiced his disapproval to the NRC. China's economy had no need for so much electricity. The country lacked the funds and technology to realize the project on its own, and the U.S. would probably not issue China a loan, since Congress hesitated to fund the much less expensive TVA. Even were the U.S. to back the dam, Zhang was still against it, because it would give the U.S. too much control over China's economy.

GMD leader Chiang Kai-shek disagreed, and he had the NRC hammer out a contract with the United States in 1945. According to its terms, the U.S. would loan China \$3 billion, and a group of American engineers, led by Savage, would supervise the Three Gorges project (Wanli Changjiang zengkan, p. 260). Despite his reservations, Zhang returned to China to take part. The TGD was a prime opportunity to advance his lifetime goal of building dams to empower the Chinese nation against imperialism (Yan, p. 16).

In accordance with the U.S.-China contract, the NRC posted experts to the U.S. Bureau of Reclamation's headquarters in Denver to elaborate a regional development plan. Chinese participants included recent graduates in the U.S. and members of the NRC, the Yangzi River Commission, and central ministries. In parallel, the NRC founded a project headquarters in Nanjing. Following Savage's advice, the NRC appointed American engineer John Cotton as

its director and hired other experts from the TVA, the Coulee Dam, and the U.S. military. The NRC pooled domestic engineering talent as well (Wanli Changjiang zengkan, 262-263). Savage's initial surveys were inadequate, and so lead planners requested more surveys. Lead planners were however in Nanjing and Denver, and so they had to rely on geological teams in the Three Gorges region to gather information. As a result, planners had sometimes to wait for data, before they could research key technical questions and craft dam designs (Wanli Changjiang zengkan, 267-275).

In 1947, the NRC suddenly terminated its partnership with the United States. The cause was the eruption of the Chinese Civil War between the GMD and the CCP in 1945. World War II had weakened GMD finances, and the civil war drove them further into the red. By 1947, the government lacked dollars to pay for U.S. goods and services, and so the NRC informed the Bureau of Reclamation that China was suspending the Three Gorges project. A subsequent report talked about reviving the dam, when funds became available (Wanli Changjiang zengkan, 275-281). The report was prescient. Once China's finances were in order, the Three Gorges project started back up, but only after the the CCP pushed the GMD off the mainland to Taiwan and allied with the Soviets against the Americans in 1949.

Planning with the Soviets

Upon taking power, the CCP established the Yangzi River Water Conservancy Commission and selected Lin Yishan as its director. Lin's credentials were not based on his technical expertise. Rather like many top CCP leaders, they were based on his Party activities since the early 1930s (Lee, 47-74). It might thus seem that Lin's appointment is evidence that the CCP's approach to the management of the Yangzi River was not technocratic. While it is true that Lin did not start out as a technocrat, he became one. Like many CCP revolutionaries turned bureaucrats, he took special classes in science and technology relevant to his position in the 1950s. What is more, he stressed technical expertise in his handling of the Three Gorges project (Lin, 2004). It is also worth mentioning that that like other highly valued projects, the CCP retained some GMD era technocrats in the Yangzi Commission (Zhonggong zhongyang dangshi yanjiu shi, 6; Feigenbaum, 2003).

In its early years, the Commission focused on flood control. Its first major endeavor was the Yangzi River Flood Diversion Project, which mobilized 300,000 people for flood control work in 1952. In 1953, Mao Zedong toured the Yangzi with Lin Yishan and naval personnel

on the Yangzi River Warship, an event Mao feted as China regaining sovereignty over its waterways from imperialism (Fenghuang wang, 2007). During the tour, Mao asked Lin whether the flood problem was resolved. When Lin replied negatively, Mao inquired, “What would solve the scourge of Yangzi River floods?” Lin told Mao about a plan for small reservoirs along the Yangzi. Mao then solicited Lin’s opinion about whether the TGD would be better. Lin responded, “We really hope to build the Three Gorges Dam, but we dare not think about it now,” because China did not have the wherewithal to execute such a mammoth undertaking. Mao however considered the dam to be the best solution to Yangzi floods, and so he told Lin to conduct a study. Lin then ordered the Yangzi Commission’s Engineering Department to investigate whether damming the Min, Wu, Jinsha, and Jialing Rivers in the Southwest would settle the flood problem better than the TGD (Zhonggong zhongyang dangshi yanjiu shi, 7-8).

In 1954, floods killed 33,000 and damaged 4.27 million homes. After the flood, Mao inspected the situation in South China. While in Hubei, he asked Lin Yishan whether China had the technology to construct the TGD. Lin replied “If the Central Government demands at an earlier time to build [The Three Gorges Dam], it can be done relying on our own technical forces and the help of Soviet experts.” Otherwise, construction would have to wait until after China had collaborated with the Soviets on the Danjiangkou Dam on the Han River. Then, China would have the requisite experience to alone tackle the Three Gorges, and so Mao instructed Zhou Enlai to ask the Soviet Premier Nikolai Bulganin for experts to aid with designs for the Yangzi River Basin and the Three Gorges Dam.

Mao’s request received a positive response, and in 1955, a group of 143 people comprised of ministerial leaders and technical experts surveyed the Three Gorges for two months. In the end, Soviet and Chinese experts came to different conclusions. The Soviets prioritized energy development and suggested following Lin Yishan’s earlier proposal to dam the Min, Jinsha, Jialing, and Wu Rivers. The Chinese, on the other hand, took flood control as the most urgent concern and recommended the Three Gorges Dam. In December 1955, Lin Yishan and the head of the Soviet group presented their proposals to Zhou Enlai. Zhou backed China’s, because the Soviet plan would inundate lots of arable land in Sichuan, and because it did not address the flooding of areas downstream from the Three Gorges (Zhonggong zhongyang dangshi yanjiu shi, 9).

Mao was thrilled to hear about the progress of feasibility studies about the dam. In 1956, he again went to Hubei and swam across the Yangzi River, which inspired him to write the poem “Swimming” in which he mused that one day “walls of stone will stand upstream...to hold back...the clouds and rain till a smooth lake rises in the narrow gorges,” a feat which would cause the legendary goddess of the Gorges “to marvel at a world so changed” (Mao, 1956). By March 1956, over 1,000 surveyors were gathering data for the TGD and other Yangzi projects. By September 1957, geological teams had finished collecting information from over 17,448 hydrological observation stations about the Yangzi’s sediment content, historic height, and the volume of water flows (Wanli Changjiang zengkan, 28).

In May 1956, Lin Yishan published an article in support for the Three Gorges project. His endorsement was much more reserved than Mao’s paean to the power of technology and the human will to domesticate the Yangzi and impress the divine. Lin, on the one hand, said that the TGD was the optimal way to end the flood problem, and that China had the technical ability to build it. Lin also echoed earlier assessments of the dam’s positive contributions to river transport and regional agricultural and industrial development. On the other hand, Lin noted that although based on Soviet reports, the dam was technically possible, a whole slew of issues were under-investigated, such as silting trends and the best construction machinery and hydropower equipment. Only after solving such fundamental problems could China ensure that the Three Gorges Dam would be cost-efficient, based on solid research, and maximally beneficial to national development. Lin additionally repeated Zhang Guangdou’s concern that the dam’s electrical output would be much more than the Chinese economy could presently consume (Wanli Changjiang zengkan, 28-32).

Fellow hydroelectric administrator Li Rui famously came out against Lin Yishan’s argument in favor of the dam. Li disagreed with Lin Yishan’s claim that China was technologically ready to build the dam, and he did not think that China had enough money. Yet Li was not diametrically opposed to Lin’s viewpoint. Like Lin, Li Rui concluded that the TGD would generate more electricity than the local economy required. He admitted that cables could dispatch excess energy to industry far away. But, the same goal was achievable with small dams closer to industrial areas, and those dams would not lead to the forced relocation of an estimated 2.15 million from the dam’s flood zone. Li also asserted that the government should not impose its plans on local communities. It had to make a concerted effort to consult with locals and arrive at a consensus (Wanli Changjiang zengkan, 35-44).

In January 1958, Mao had Lin and Li present their standpoints at a Central Party meeting in Nanning in Guangxi province. Lin mobilized flood data since the Han Dynasty to argue that the Three Gorges was the correct place to definitively deal with the flood problem. Mao asked if the construction costs could be reduced, and Lin replied not with current technologies. Zhou Enlai interjected it was possible if the dam's hydroelectric output was decreased from 25 million kW to 5 million kW. Lin agreed, but added that it would be a waste to obtain so little energy from such a big dam. Li Rui took an opposing viewpoint. He contended that China would not demand so much electricity for a decade. He also questioned whether the dam would actually prevent floods downstream and warned that China enemies would surely take such a large dam as a target.

Mao concurred that precautions had to be taken to protect the dam, but he still ordered meeting attendees to "actively prepare" a "completely reliable" regional development plan for the Yangzi River Basin centered on the Three Gorges Dam. As Mao often did, he made Zhou Enlai the supervisor of preparations, and Zhou organized a group of 100 plus experts and Party leaders to inspect select potential dam locations. Upon completion, Zhou declared that with current technology China could build the dam within 15 to 20 years (*Zhonggong zhongyang dangshi yanjiu shi*, p.10).

Zhou then headed to a meeting in Chengdu, where Central Party and provincial leaders conducted early discussions about the Great Leap Forward campaign to rapidly expand China's industrial base. At the meeting's end, a report advocated building the Three Gorges Dam, since China had the technological capability to do so, and the dam would advance the country's long-term economic goals. But, before beginning construction, it was necessary to conduct preparatory work on all major issues. The report projected completing an initial plan for the Yangzi in 1959 and for the dam sometime between 1959 and 1963 (*Zhonggong zhongyang dangshi yanjiu shi*, 37-40).

After the Chengdu meeting, Mao rode a Yangzi steamer with Lin Yishan from Chongqing to the Three Gorges region. While on the boat, Mao emphasized the dam's significance and repeated the common tripartite claim that it would end regional floods, stimulate regional transportation, and increase available electricity. Showing just how important Mao thought the project was, he called Lin the "king of the Yangzi" and offered to resign from his current

post and become his assistant. At the end of their journey, Mao again swam across the Yangzi River. That date – March 30th – would in the late 1960s become the code name for the first dam on the Yangzi River – Gezhouba – or Project 330 (Yang, 45-47).

A Near Leap

In the late 1950s, the Great Leap Forward enveloped China in a collective fervor to accelerate economic development according to Maoist methods. According to Mao, the Soviet approach to development was too slow and granted too much authority to bureaucrats and technical experts, and so Mao elaborated a different style of socialist industrialization that would putatively enable China to be more self-reliant and make fuller use of its resource strengths (Mao, 1977). As Mao was wont to do, he gave his strategy for nationwide economic engineering a poetic sounding name – “walking on two legs” – thereby making a top-down governmental vision, which figured China as one gigantic body, appear in name to be a down-to-earth human-sized approach to development.

According to Mao, economic actors should adjust the amount of labor and capital used in the industrialization process based on their availability. In the case of China, its sizable population could compensate for a capital-poor economy and be channeled towards constructing economic infrastructure (Mao, 1977). Mao embedded this approach to development in his military thought and called for the total mobilization of the populace into a fighting force that, like the Party in the 1930s and 40s, overcame its enemies not through technical expertise and advanced weaponry, but through sheer mass willpower (Riskin, 81-256). TGD critic Li Rui denounced the Great Leap’s developmental strategy and was imprisoned for two decades (Li, 2016: 308-319).

When it came to the TGD, the Party’s turn towards a Maoist developmental path had consequences similar to elsewhere in China. It led to a nationalist emphasis on liberating the masses from oppressive foreign models that stressed high technology and bookish knowledge. The Great Leap’s influence is visible in meetings about the dam held by bureaucrats and technical experts in June and October of 1958. During these meetings, attendees surveyed possible dam locations, and they discussed technical issues, such as the dam’s optimum location and shape as well as the best techniques to ameliorate river transport, generate electricity, control floods, and divert water for irrigation.

But, at the same meetings, they also debated the ideal way to draw on the masses' power, so that they could realize monumental feats of physical strength and create technological inventions of intellectual ingenuity that went beyond what was currently thought possible worldwide. In this vein, attendees exercised their techno-scientific imagination and foresaw a giant mechanical crane that could move mountains and the cultivation of a new generation of workers that arrived at the forefront of techno-science, not through formal schooling and research, but by making the TGD (Wanli Changjiang zengkan, 49-58).

During the Great Leap, Maoist flights of scientific fantasy fueled other dam projects. The most infamous case is the Yellow River's Sanmenxia Dam, where CCP leaders implemented Mao's voluntarist approach to development and made up for shortages of industrial capital with the mass mobilization of militias. Their efforts erected a dam, but it was structurally unsound, quickly silted up, and eventually could not generate electricity (Pietz, 211-219, 225-229, 301-302). Less well known is the Danjiangkou Dam in northwest Hubei, which Lin Yishan had suggested as a training ground for the TGD. The Danjiangkou Dam did not end up being the model of technical proficiency that Lin had hoped, as it suffered from similar problems of poor engineering as the Sanmenxia Dam (Hubei sheng wenshi ziliao, 1-7).

What then of the Three Gorges Dam? The Party Center moved towards building it in September 1959, when plans for the dam and Yangzi Basin were completed, and the head Soviet expert in China told Zhou Enlai that they could prepare to begin construction. But, it was not until April 1960 that the Central Party proposed investing 400 million RMB in the Three Gorges project and suggested starting construction in 1961 (Zhonggong zhongyang dangshi yanjiu shi: 11.). That never happened, as it was already clear to the Party Center that Mao's predicted Great Leap into a prosperous industrial future had actually resulted in a full-on plunge into famine and mass death (Wemheuer, 2014). And so, CCP leaders put the TGD on hold again. By late 1961, most Yangzi Commission personnel were involved in farm work, probably to ward off starvation (Zhonggong zhongyang dangshi yanjiu shi: 11).

A Botched Attempt

The Three Gorges project remained dead in the water until 1969, when Hubei provincial officials breathed bureaucratic life back into it. The stimulus was anticipated electricity shortages caused by the CCP's Third Front campaign to ramp up military industry in Central China in the wake of rising Sino-Soviet tensions along the northern border (Naughton, 1988).

At the time, Hubei was led by members of the People's Liberation Army, which Mao had deployed in 1968 to repress the Cultural Revolution's Red Guard movement and bring order to the country (Walder and Su, 2003). Both Hubei's First Party Secretary – Zeng Siyu – and the second-in-command – Zhang Tixue – had first taken part in revolutionary activities in their teens in the Party's mountain base areas and subsequently risen up its military arm (Zeng, 2014; Hubei sheng Zhonggong dangshi, 1989).

In March 1969, Zhang invited Yangzi Commission members to survey the Three Gorges. Afterwards, he put forward the idea of building the dam to the vice heads of the Ministry of Water Conservancy and Electric Power Qian Zhengying and Wang Yingxian. Qian and Wang endorsed Zhang's proposal, much to his delight. On a visit to Hubei in May, Mao met with Zhang Tixue and Zeng Siyu and discussed the dam. Mao poured cold water on Zhang's enthusiasm. With Sino-Soviet tensions intensifying, Mao thought "right now is a time to prepare for war, it is inadvisable to consider this...If a basin of water fell on your head, would you be scared?" Not deterred, Zhang looked for other options. A member of the Yangzi Commission suggested the Gezhouba Dam. Like the Three Gorges Dam, it would churn out mammoth amounts of energy, but it was a low dam, and so the consequences of a bombardment would be less disastrous than the destruction of the Three Gorges high dam (Zhonggong zhongyang dangshi yanjiu shi: 12).

Zhou Enlai arranged to discuss the Three Gorges project at a national planning meeting in February 1970. Cultural Revolution struggles had landed Lin Yishan in an informal prison in Wuhan. Wanting to know his opinion, Zhou had Hubei military leaders secure his release. At the meeting, Lin learned to his great surprise that some officials were pushing to build the Three Gorges Dam while Mao was still alive (Hubeisheng weiyuanhui, 1993: 32).

In October 1970, Zhang and other Hubei leaders reported their ideas to the State Council. During the meeting, Zhang made a military pledge to Zhou Enlai and other Party leaders that "If there was a problem with the Gezhouba Dam, then take my head and hang it from Tiananmen." (Zhonggong zhongyang dangshi yanjiu shi: 12). Despite their apparent ardor for Gezhouba, Zhang Tixue still preferred the Three Gorges Dam, and so he and Zeng Siyu visited Mao in December. Mao started out by chastising Zhang for hurting so many with the Danjiangkou Dam. He tempered his criticism and said that on the other hand, Zhang did have experience with dams, and Zeng was not bad at fighting battles. Yet, Mao still wondered

whether they were ready for the Yangzi's first dam. Zhang responded with a famous Mao quote in which he praised learning by doing. Mao complimented them for having guts.

Zhang then talked about how a decade of preparations had already occurred, and how the dam would realize Mao's poem "Swimming." Mao was not swayed and rejected their proposal, because they did not have adequate funds, scientific information, designs, or construction plans. Also, if an atomic bomb hit the Three Gorges Dam, it could cause flooding all the way to Shanghai. At that point, Zhang began pressing his case for the Gezhouba Dam, stating that he had brought experts to Gezhouba to research it, and they were ready to move ahead. Mao gave the okay and enjoined them to talk with Zhou Enlai and cooperate with relevant ministries (Hubeisheng weiyuanhui, 10-17).

Meanwhile, Zhou Enlai, possibly at Mao's behest, asked Lin Yishan to write a position paper on the Three Gorges and Gezhouba Dam proposals. In November 1970, the State Council held a meeting on the different options. Lin argued that the Three Gorges Dam should be built first, because Gezhouba would cause the water level to rise twenty meters and make the Three Gorges Dam more difficult and expensive (Zhonggong zhongyang dangshi yanjiu shi, 12). There were also not adequate development plans for Gezhouba. The Party's intention had always been to build the Three Gorges Dam, and so engineers had made designs. Only since 1969 had there been much effort to work on Gezhouba, and that had yet to yield formal designs. In spite of Lin's criticisms, the State Council provisionally approved the construction of Gezhouba (Hubeisheng weiyuanhui: 20, 33-34, 54).

Zhou however thought Lin's position paper was "a powerful opinion," and so he submitted it to Mao along with the Gezhouba plan, his own letter, and a report, which depicted Gezhouba as realizing the ideal Mao immortalized in his poem "Swimming" of a "smooth lake rising in the narrow gorges." In addition, Gezhouba would fulfill electricity demands, simulate river transport, and overcome Yangzi floods. As a low dam, it posed less of a security challenge, and planning was based on a decade of geographic research and dam modeling experiments for the Three Gorges project, so the past twenty years' mistakes in dam building could be avoided and adjustments could be made during construction (Hubeisheng weiyuanhui, 4).

Mao read the Gezhouba file on his 77th birthday December 26, 1970, and despite the fact that there were insufficient designs, he gave it his imprimatur with the caveat that later revisions

should be made as appropriate (Hubeisheng weiyuanhui: 34). This decision set off of a tidal wave of activity in Hubei, as the provincial government in good Maoist fashion mobilized 100,000 militia members and implemented a policy known as the three simultaneities in which survey, design, and construction work were carried out simultaneously. As the dam took shape, technicians expressed concern to Gezhouba's military leadership about a range of issues from the lack of anti-silting plans and qualified construction workers to laborers pouring concrete without adding ice to stop its expansion. Military leaders excoriated them for betraying the Maoist developmental path (Hubeisheng weiyuanhui: 34, 75-79).

After a few months, Gezhouba rose above the Yangzi River, but its innards were like a honeycomb (Hubeisheng weiyuanhui: 69). In late 1972, Zhou Enlai held meetings in which he lambasted project heads, yelling that "If the Yangzi River has a problem, it's not one person's problem, it's the entire country's problem." To prevent Gezhouba's collapse, Zhou demanded workers stop construction immediately and not resume building until technical personnel had made plans that guaranteed the dam's stability. In 1974, construction work started up again. But, by that time, CCP leaders had switched to the American side in the Cold War and begun moving China back towards a more technocratic style of development (Fan and Yang, 67-69; Lee, 163-328).

Conclusion

Three notable features stand out in Chinese efforts to build a Three Gorges Dam between the 1910s and 1970s. First, Chinese leaders exhibited the late developer's penchant for state-led industrialization. Second, Chinese elites conceived of the Three Gorges Dam as the centerpiece of a program to technologically re-engineer the Yangzi to boost national power and overcome China's position of international weakness. Lastly, due to insufficient domestic capital, elites formed partnerships with more technologically advanced countries. These three trends resulted in two technological styles.

The dominant technological style was technocratic and granted technical experts more authority in the decision-making process. This technological style is evident from Sun Yat-sen's solicitation of foreign aid in the 1910s to the GMD's collaboration with American engineers during the Second World War. After the CCP took power in 1949, the Party gave Chinese and Soviet experts significant influence over the Three Gorges project. Only during the Great Leap Forward did a Maoist technological style gain prominence, which put more

stock in mass mobilization and national voluntarism than technical expertise and industrial equipment, an idea that led to a bungled attempt the first time the CCP tried to build a dam in the Three Gorges region in 1971.

Yet, even in this instance, CCP leaders were not entirely indifferent to technical concerns, as evidenced in their queries about whether there were adequate survey data and construction plans. Ultimately, Mao did not listen to the technical advice of the bureaucrat he once anointed the “king of the Yangzi” – Lin Yishan. Instead, Mao backed a provincial proposal to build Gezhouba and realize his techno-political dream of a giant wall that tamed the Yangzi River within his lifetime. Once Zhou learned the resultant dam was not viable, he quickly shut the project down and charged Lin and other technocrats with designing a Gezhouba plan in which technical issues held priority. Revisiting a well-worn script of modern Chinese statecraft, they looked abroad for foreign assistance and found the United States (Li, 1999).

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