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Dreaming of a Three Gorges dam amid the troubles of Republican China

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ABSTRACT

This article examines Republican-era efforts to turn the Yangzi River into an engine of national development by building the Three Gorges Dam (abbreviated as TGD). Beginning with Sun Yat-sen's initial proposal in 1919 and ending with a Sino-American attempt in the 1940s, it analyzes how Chinese and foreign actors went about developing such a dream. Every endeavor ran into a similar problem: China did not have the industrial, administrative, or financial capacity to accommodate the gargantuan hydraulic feat, an issue which critics repeatedly raised. Undeterred, the dam's backers pushed for China to overcome a domestic lack of capital by collaborating with foreign technocrats. A joint venture would purportedly benefit both China and foreigners by not only facilitating trade with inland areas and producing a huge monument to the powers of modern engineering, but also because the dam's immense electrical output would boost China's transformation into an industrial powerhouse, one that would increasingly desire foreign goods. Although the Three Gorges Dam was not realized in the Republican Period, Chinese and foreign actors continued to pursue their infrastructure dream in order to fuel national industrialization on both sides of the Taiwan Straits during the Cold War.

KEYWORDS

History; China; government; water; environment

In August 1944, a group of passengers embarked on a steamboat from China's wartime capital at Chongqing and traveled downstream on the Yangzi River to the Three Gorges region. China's central economic planning group—the National Resources Commission (NRC)—dispatched this boat party to aid American civil engineer John L. Savage's survey for a Three Gorges hydropower station.¹ As the boat tumbled along river rapids, Savage marveled at the mountains that encased the Yangzi's impressive volumes of water. What particularly impacted Savage's notions of engineering development was the river's untapped liquid energy, a condition that, Savage observed, had led China's "founding father Dr. Sun Yat-sen" to propose in 1919 that the Three Gorges' "huge amount of water resources" be made into a hydroelectric motor of national industrialization.²

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¹Zhang, *Minguo sanxia*, 101–102.

²Yang, and Fan, *Yichang*, 26.

Sun Yat-sen was the first Chinese leader to express a vision of transforming the Three Gorges' power into an engine of national prosperity. But Sun's proposal ran into an overarching problem that would bedevil subsequent development schemes concerning the Three Gorges Dam (TGD) in Republican China (1911–1949). Namely, the country simply did not have the industrial prowess, administrative capacity, or financial wherewithal to engage in an endeavor of this scale. Sun's solution hit on themes that would reappear in later Republican-era efforts. Sun advocated what James Scott has characterized as a high modernist approach to development, which called for high-level administrators to re-engineer the physical and social geography of the Three Gorges region itself, in order to create social, economic, and environmental conditions there that would facilitate a project of such size.³

Aware that a shortage of domestic capital made it impossible for China to realize giant infrastructure projects, Sun Yat-sen suggested as a workaround that there be a Chinese- foreign technocratic collaboration for the TGD. Both foreign and Chinese technocrats would benefit from this joint venture, because a result would be that the dam would not only make it easier to reach inland areas, extract natural resources, and increase interregional trade, but its immense output of electricity would advance the transformation of China into an industrial powerhouse with a much larger demand for foreign products. Around the same time, British engineer Sidney J. Powell expressed interest in constructing the TGD. Neither his nor Sun's plan received immediate financial support. This result is not surprising given that China was then in a state of internecine wars, and European and American leaders had serious doubts about the Chinese government's capability to modernize – two conditions which both Sun and Powell rashly ignored amidst their dreams of building a huge hydraulic driver of Chinese development.⁴

Though Sun Yat-sen's proposal never got off the ground, his political party, the Guomindang (GMD), shared his desire to have technocrats catapult China into the ranks of the world's leading industrial nations.⁵ And so, after founding a national government in 1927, the GMD established central government agencies to oversee industrial development nationwide. What prompted the GMD to devote much of these agencies' sparse resources to preliminary surveys for the TGD was the disastrous 1931 Yangzi River flood. But all this ground to a halt due to several things: the high price of the GMD's war against the Chinese Communist Party (CCP), doubts about whether China's weak industrial base could sustain the project, and misgivings about government funds spent on a huge dam when China's largely agrarian economy had no way of even using so much electricity. Planning efforts lay dormant until Japan's bombing of Pearl Harbor in December 1941 led the United States to ally with China against Japan and pledge resources to Chinese industry. This policy buoyed GMD hopes that Japan would soon be vanquished, and that Washington would help fulfill China's developmental ambition of constructing the TGD as part of postwar economic reconstruction.

³Scott, *Seeing Like a State*, 88.

⁴Cohen, *America's Response*, 94–114; and Bickers, *Out of China*, 41, 105–106, 123–125.

⁵Strauss, *Strong Institutions*; and Kirby, "Engineering China," 137–160.

To head up technical work, the NRC hired the world-renowned John L. Savage (introduced above). Like many European and American technical experts at the time, Savage had dreams of making a big mark in the annals of modern engineering, in his case by deploying his skills to benefit underdeveloped parts of the world through mammoth infrastructure projects.⁶ Chiang Kai-shek willingly entertained Savage's technological reverie, since he had his own aspiration of cementing America's technical, financial, and military commitment to China's defense and industrialization.⁷ Chiang thus endorsed China's accepting a billion-dollar-plus loan from the United States to pay Savage and his colleagues at the U.S. Bureau of Reclamation to work with the NRC on the TGD even though the costs of World War II had already almost totally drained China's finances.⁸

Some U.S. State Department officials found the Chinese government's support for the dam misguided and thought that it would be better if China directed its limited fiscal and industrial resources to smaller endeavors with more easily obtainable results. Despite the dissent, the State Department's top brass sided with the U.S. Bureau of Reclamation, who emphasized the way in which the dam would kickstart China's industrialization and provide as well a large market for exporting American capital. American media acted as a booster for the TGD too, stressing how the dam's construction would show that the United States was acting as a responsible global leader and using its prodigious economic resources to squelch Communist revolutions in war-torn Asia and further peace and prosperity in the region through industrialization in general.

Within China, some people viewed America's rising economic power in a quite different political light. They denounced the GMD for granting the United States too much control over China's developmental direction. Some also questioned why China should build the dam when its economy could not absorb so much new electrical power, and doubts appeared concerning whether the GMD could consummate such a gigantic project when China had only a small industrial base; the GMD was ridden with factions, and the government had not found popular support. Ultimately, the GMD's dream of building the TGD with American backing was shattered by China's abysmal finances and the CCP's 1949 victory in the Chinese Civil War. In the international order that followed the CCP's rise to power, the United States, the GMD in Taiwan, and the newly established People's Republic of China (PRC) continued to dream of constructing massive dams whose energy could fuel whole regions. These nations, however, pursued their infrastructural fantasies on opposite sides of the Cold War.⁹

The birth of the hydro-power dream

To broaden the context of a history of the TGD, in this section we consider the paths taken earlier, when hydro-power was first invented and applied. Shortly after the Edison Company put the first hydroelectric waterwheel into operation in 1882, hydropower

⁶Cooper, and Packard, *International Development*; Zanasi, "Exporting Development," 1-27; Ekbladh, *The Great American Mission*, 14-113; and Latham, *The Right Kind of Revolution*, 10-35.

⁷Taylor, *Generalissimo*, 254-255, 262-263.

⁸van De Ven, *War and Nationalism in China*, 260, 269.

⁹Bian, "Building State Structure," 35-71.

caught the eye of certain leaders in China as a method of augmenting the nation's energy supply.¹⁰ Sun Yat-sen was one of the first to call on China's government to build up its hydraulic infrastructure in order to exploit the energy surging through domestic waterways. This would alleviate and mitigate the overhead costs involved in the newly-introduced coal-power electric generators, in limited urban use in China. Sun's first known interest in hydroelectricity dates to 1894 when he sent a letter to the well-known proponent of the Self-Strengthening movement, Li Hongzhang; the letter noted that "people had recently found a new way" to produce electricity. No longer was it necessary to rely solely on coal. It was now possible "to use falling water to generate electricity," and unlike coal, a river could pump out "limitless" energy for a country's developmental endeavors.¹¹ Hydropower dams could, it was noted, also provide energy in areas without nearby coal deposits and could help prevent flooding and smooth out river currents, stimulating river traffic and facilitating access to China's interior.¹²

In his later years, Sun Yat-sen continued to imagine ways to press China's environmental resources into the service of industrialization. His grandest plan was, as mentioned, published in 1919, right after World War I; it was titled *The International Development of China*. Sun recommended that Western nations redirect capital previously tied up in producing weapons to speedily bringing industrial modernity to China, whose "proper development would create an unlimited market for the whole world."¹³ For China to economically progress, it had to partner with Western countries to obtain the necessary technical expertise, machinery, and funding, since the Chinese economy had not yet "entered the first stage of industrial evolution" and still mainly employed manual labor for economic production.¹⁴ With foreign support, China could, he thought, open up a multitude of mines and factories, construct an array of commercial harbors, lay a 100,000 miles of railways, set up one million miles of roads, and fix up all the major rivers with hydropower plants.¹⁵

Many of course already realized that the largest hydroelectric station in China might be stretched across the Yangzi River in the Three Gorges region. By capturing the Yangzi's fluid power with a concrete dam, the Chinese government could redirect the river's tremendous energy flows towards powering industrialization. Damming the Yangzi would also advance the compression of national time and space, as the dam would produce a placid lake eliminating the dangers of the Yangzi's rapids and enabling faster and more secure travel "to all navigable points in China" all year round.¹⁶ Facilitating the movement of passengers and products around different parts of the country, the dam would not only reduce a hundredfold "transportation expenses to the richest emporium in West China," it would also steeply increase commercial ties between the coast and the interior.¹⁷

No foreign governments or private businesses took up Sun's offer to invest in the TGD construction. The lack of foreign response was to be expected given that China

¹⁰Smil, *Energy*, 286.

¹¹Zhang, *Minguo sanxia*, 6.

¹²Yang, and Fan, *Yichang*, 19-20.

¹³Sun, *International Development*, 5.

¹⁴Ibid.

¹⁵Ibid., 6-8.

¹⁶Schivelbusch, *Railway Journey*.

¹⁷Sun, *International Development*, 73-74.

had no functioning central government which could oversee the project. Nor did China even have reliable regional officials who could guarantee the stability of the local economic environment since Chinese politics at both the regional and national level was dominated by warlords engaged in frequent combat.¹⁸ The political and economic turmoil of the Republican Period stimulated a widespread disbelief among European and American elites about whether Chinese leaders even had the ability to govern their country or lead the nation toward modernity, to say nothing of a large-scale industrial project.¹⁹

The lack of foreign investment in building the TGD was not due to a lack of interest in the developmental promise of the Three Gorges region itself. The British had long been attracted to a late Qing dynasty plan to blow up rocks in the Three Gorges area, so that large boats could go up the Yangzi all the way through to southwest China and mine its natural resources.²⁰ When the above-mentioned British engineer Sidney J. Powell learned of the Qing plan, he applied and received funding from the Chinese government to travel to the Three Gorges in 1919 to inspect local geological conditions. Powell determined that the best way to pacify the Yangzi's rocky waters was to construct twenty-one dams between Chongqing and Yichang. The large reservoirs held behind by these dams would not only inundate rocks in the area. They would also annually generate 3,382.4 MW of electricity for the cost of a bit over 1 million pounds.²¹ Chinese political turmoil probably factored into European and American disinterest in Powell's proposal.²²

Although Powell's plan did not find a foreign backer, it did gain the support of Shanghai's famed newspaper *Shenbao*. In a 1919 editorial, the newspaper agreed with Powell's conclusion that the Three Gorges was the perfect site for a series of hydro-power stations because between Chongqing and the Three Gorges the Yangzi River fell over 500 meters. Despite some public interest in his plan, the idea was a non-starter for Chinese officialdom since the exorbitant costs involved far surpassed domestic financial means, and the country had no central government to supervise such a massive project.²³

Nanjing decade preparations

China's domestic political situation became less unstable after the GMD founded a new central government in Nanjing in 1927.²⁴ National industrialization was of prime importance to the GMD leadership, which was, in William Kirby's words, "imbued with a technocratic confidence" that if technical experts were granted state power, they could engineer "the industrial metamorphosis of national life."²⁵ To commandeer China's development, the GMD set up central agencies staffed with individuals who had received technological training in either the United States, Japan, Europe, or

¹⁸Lary, *Warlord Soldiers*; and Billingsley, *Bandits*.

¹⁹Cohen, *America's Response*, 94-114; and Bickers, *Out of China*, 105-106, 123-125.

²⁰Giersch, *Corporate Conquests*.

²¹Zhang, *Minguo sanxia*, 24.

²²Green, *By More Than Providence*, 152.

²³Zhang, *Minguo sanxia jiyi*, 30.

²⁴Lieberthal, *Governing China*, 34-35.

²⁵Kirby, "Engineering China," 137-138.

Chinese schools that were modeled after Western ones.²⁶ At the very top of the economic bureaucracy was the National Defense and Design Commission (NDDC), which was created to engage in economic planning nationwide. The GMD also established organizations to handle the development along major riverways. Assigned to oversee the Three Gorges region was the Yangzi River Water Management Commission, formed in 1928.

Administrators put in charge of Yangzi River affairs sought to realize Sun Yat-sen's hydro-political dream of taming the waters of the Three Gorges and turning them into a dynamo of national development.²⁷ Added impetus was given toward it when in 1931 the river burst its banks and produced a massive flood. The 1931 flood's precise death total is unknown. According to a contemporary Nanjing University survey, around 150,000 perished. This calculation, however, only considered the flood's first hundred days. Since many later died due to disease and famine, and Nanjing University surveyors did not include conflict zones. A historian of the 1931 flood, Christopher Courtney, has suggested that the GMD-led National Flood Reform Commission's estimate of two million dead is probably close.²⁸ No matter what the exact number of fatalities was, the huge scale led to the Director of the National Committee on Electrification, Yun Zhen, suggesting the following year to the Vice Director of the NDDC Qian Changzhao that a survey team go to the Three Gorges to investigate the possibility of erecting a dam. Qian agreed and transferred technical personnel to the Three Gorges region. American engineer Col. C.G. Stoebe was also brought in as a technical adviser to make up for China's inexperience in constructing hydropower stations.²⁹

After two months of fieldwork, Yun Zhen and his colleagues submitted their findings to the NDDC. Their report argued in favor of building the dam for several reasons. Like both Sun Yat-sen and Sidney Powell, the report noted that a dam could flatten out the treacherous waters and simplify access inland resources, spurring broad regional economies. The report admitted that building the dam would be costly, especially since China would have to purchase large amounts of equipment from abroad. Yet it was pointed out that the Soviet Union had followed a similar developmental path when it hired American engineers and bought American machinery to construct the Dnieper Hydroelectric Station in the late 1920s. What is more, the resultant electricity had stimulated regional industrialization in the Soviet case, and the report claimed that the same would happen in China.

Were the dam not to be constructed, it would be difficult for industrialization to move ahead in South China due to the dearth of coal to generate electricity. This is why the government had to take advantage of water resources in South China and augment the region's hydro-electric infrastructure.³⁰ To further lift regional energy output, the government had to construct two more hydropower stations farther up the Yangzi River in western China. A chemical plant had also to be constructed to make chemical fertilizers that would expand food output. While the report lauded the dam's benefits, it

²⁶Yeh, *Alienated Academy*; and Bian, *Making of the State Enterprise System*, 321.

²⁷Zhang, *Minguo sanxia*, 27.

²⁸Courtney, *Nature of Disaster*, 4-5, 249-250. The quote is on page 250.

²⁹Zhang, *Minguo sanxia*, 46.

³⁰Zhen, "Yangzi jiang," 51-71.

concluded that constructing the dam was presently inadvisable since China lacked the necessary fiscal and industrial resources, and China's agrarian economy did not need such copious quantities of electricity.³¹

One participant in these survey efforts was a certain Song Xishang. Song summarized the group's findings in a Yangtze Commission report, which served to reveal his cosmopolitan background as a graduate of engineering programs at MIT and Brown. The report opens with a passage that portrays China as one link in a global network of hydropower experts engaged nation-building. Song also translated the TGD into relatively more specialist technical language and placed English and Chinese terms next to each other when discussing the dam's principal structures. Song showed his support of foreign models of hydrological development when he referred to the regional activities of the U.S. government's Tennessee Valley Authority (TVA). Song adopted the technocratic mindset of the TVA and called on hydropower experts to make a comprehensive plan that took into account the economic benefits that the dam could yield for the Chinese people by expanding regional transport, irrigation, and energy supplies.³²

In the end, the Director of the NDDC, Weng Wenhao, decided not to go ahead with building the dam. His decision was not due to a lack of personal enthusiasm. When Weng received the aforementioned report from his colleagues extolling the TGD's industrial benefits, he was excited and wished that he could act on its recommendations. He, nonetheless, came out against pursuing any further work on the TGD because of the poor national fiscal situation. Weng also complained that the NDDC's report gave absolutely no consideration to the roughly 200,000 people that would have to be relocated for the dam's reservoir. When Chiang Kai-shek learned about this problem, he was not worried. He reportedly told Weng Wenhao that "if you guys want to build a dam at the Three Gorges, that's a good thing. Won't 200,000 people have to be relocated then? Let them all be enlisted in the military and give them to me to fight the Communist Party!" Chiang's fervor for eliminating the CCP was, according to Weng's memoirs, what brought preparations for the TGD to a standstill in the mid-1930s, as the costs of waging civil war had blasted a big hole in the government's bottom line.³³

The Sino-American alliance and John L. Savage's plan

In the 1930s war kept the Three Gorges project off the Chinese government's docket. Funds were at first not available because of the extensive resources the GMD devoted to battling the CCP. A large economic project was made even more difficult when Japan invaded in 1937, followed by the GMD's retreat inland to Sichuan to set up a new central government in Chongqing.³⁴ When the GMD arrived in the interior, they initially had no interest in resurrecting efforts to build the TGD. The government instead favored constructing small dams in the southwest and so organized a survey group to locate potential sites for hydropower plants.³⁵ The GMD's industrial development plans underwent an important

³¹Wanli, *Sanxia gongcheng*, 255-258.

³²Guowuyuan, *Bainian*, 4-8. On the TVA, Worster, *Rivers of Empire*; Klingensmith, "One Valley and a Thousand"; and Sneddon, *Concrete Revolution*.

³³Zhang, *Minguo sanxia*, 71-73.

³⁴Mitter, *Forgotten Ally*, 79-172; and Lary, *Chinese People*, 15-77.

³⁵Zhang, *Minguo sanxia jiyi*, 84-85.

shift when the U.S. joined China's fight against Japan in 1941, after Pearl Harbor. Prior to that watershed event, Washington had placed China far lower on its geopolitical agenda than Europe, and it had not shown much interest in broadly supporting its development.³⁶ Chiang Kai-shek hoped that Pearl Harbor would considerably alter America's priorities, and became overjoyed when he learned about the Japanese attack; he thought "that the United States would defeat Japan for him," as S.C.M. Paine has stated.³⁷

Chiang's excitement about the Sino-American alliance wore off to some degree when Washington continued to prioritize the war in Europe and was not as forthcoming with military and economic support as the GMD wanted.³⁸ Although the United States channeled vastly more resources to its European allies than to China, the GMD leadership still viewed the American alliance as a way to further China's industrialization and sought ways to elicit U.S. support.³⁹ Despite remaining focused on Europe, Washington did become more interested in China. China's and America's wars against Japan had now overlapped.⁴⁰ Leading China's efforts to cultivate American assistance was its institutional replacement for the NDDC—the National Resources Commission, which oversaw nationwide industrial development.⁴¹ One avenue the NRC pursued to strengthen domestic industry was to send technical personnel to the United States for training. Thus, in 1942 the thirty-one engineers visited American government institutions and private companies to learn the technical and administrative skills required for building large industrial projects.⁴²

The NRC posted Berkeley-trained civil engineer Zhang Guangdou to the Tennessee Valley Authority. While stationed there, Zhang ran into his former colleague at the U.S. Bureau of Reclamation, John L. Savage, who was part of an elite group of American hydraulic engineers, which governments worldwide tended to hire to advise on hydro-power projects.⁴³ When Zhang came across Savage, the latter was about to depart on such a venture to India to consult on dams. Zhang suggested to Savage that after going to India, he might provide the same service to China, and Savage agreed. Zhang then wrote NRC Vice Director Qian Changzhao and recommended that he invite Savage to advise on current Chinese hydraulic projects and map out future endeavors.⁴⁴ Qian gave his assent and cleared the way for Savage's visit in late 1944.⁴⁵

Upon arriving in China, Savage learned about the work of fellow globe-trotting American engineer, G.R. Paschal, whom the Chinese government had recently employed to create solutions to China's economic problems. Paschal had predicted that after the war concluded, widespread electricity shortages would be a major restraint on China's industrialization. The Chinese state, in his view, lacked the funds, industrial equipment, and technical personnel to boost electrical output. The commercial sector could also not be counted on to undertake large-scale infrastructure projects. The

³⁶Cohen, *America's Response*, 94-114; and Chang, *Fateful Ties*, 116.

³⁷Paine, *Wars for Asia*, 181, 189. The quote is on page 189.

³⁸Mitter, *Forgotten Ally*, 242.

³⁹van de Ven, *China at War*, 159.

⁴⁰Paine, *Wars for Asia*, 3. The quote is from Franklin D. Roosevelt, Speech by Franklin D. Roosevelt, New York Transcript, 1941. <https://www.loc.gov/item/afccal000483/>.

⁴¹Kinzley, "Crisis," 565-570.

⁴²Zhang, *Minguo sanxia*, 87.

⁴³Sneddon, *Concrete Revolution*, 30-36.

⁴⁴Guo, and Zhou, *Zhang Guangdou*, 40-43.

⁴⁵Sneddon, *Concrete Revolution*, 38.

answer to China's energy woes was the United States, which had all the necessary assets. The project that the United States ought to support, in Paschal's opinion, was the TGD because it would give the huge lift to electricity production that China's industrialization required. In addition, portions of the dam's electricity could be routed to projects yielding export goods, such as potentially a large fertilizer plant whose output could be shipped across the Pacific Ocean to relieve fertilizer shortages in the United States.⁴⁶

Savage was so impressed with Paschal's plan that he requested that his Chinese hosts take him immediately to the Three Gorges to conduct a preparatory survey. NRC Director Weng Wenhao shared Savage's enthusiasm for Paschal's proposal and organized a group of NRC staff to travel with Savage by military escort down the Yangzi. A civilian steamboat was used because the Japanese military had occupied an area near the Three Gorges, and a military vessel might be spotted by the Japanese. When the group arrived in the Three Gorges region, they set to work collecting geological information. They climbed up and down steep mountains and crossed perilous water courses: one engineer accidentally fell and drowned. After camping in the Three Gorges for ten days, the team gathered up the data and boated back to Sichuan to create a preliminary report on how Three Gorges water resources could be harnessed.⁴⁷

In the report's introduction, Weng Wenhao voiced support for the project. He probably anticipated the typical criticism concerning the agrarian economy's lack of a need for electricity and so declared that once the war was over, industrial construction would proceed at a quick pace and that "power development in the ensuing years will be very much accelerated according to the demand of other industrial developments." Weng nevertheless acknowledged that building the dam was beyond China's current fiscal and technical abilities. He thus enjoined "the U.S. government ... to encourage American engineering and financial institutions" to help bring "about our plans to the stage of actual construction."⁴⁸ To demonstrate the investment opportunities that the United States could obtain by backing the Three Gorges Dam, Weng presented an array of industrial projects that the Chinese government planned to build in conjunction with the dam in the first five years after World War II and for which China would need foreign companies and engineers to bring to fruition.⁴⁹

John Savage was equally effusive. Usually, however, he acted modestly, and concerning the dam construction he did not talk about the prestige he could garner. Yet we have his comments about the dam's centrality to Chinese development and its significance in the history of modern engineering that show that he was cognizant of how leadership of the Three Gorges project would cement his place as one of the most important engineers of all time.⁵⁰ In Savage's view, the Three Gorges Dam was a "classic," not only because of "the unprecedented magnitude of the works to be constructed," which would put the marvels of contemporary hydraulic techniques on display to the entire world, but also because the TGD would "bring great industrial developments in Central and Western China," which would help solve China's economic troubles, provide opportunities for "widespread employment" in industry, and

⁴⁶Paschal, "Zhongguo liyong," 93-95.

⁴⁷Yang, *Yichang*, 26-28. Wanli Changjiang zengkan, *Sanxia gongcheng shiliao huibian*, 99.

⁴⁸Savage, *Preliminary Report*, 1.

⁴⁹*Ibid.*, 2-4.

⁵⁰On engineers as modern heroes, Hughes, *American Genesis*, 88-89.

lead to “high standards of living” throughout the country.⁵¹ He made one point concerning security, namely that to ensure that air raids could not inflict large damage on such a project, all power-related equipment would be located inside mountain caves.

According to Savage’s calculations, the TGD could annually produce 68.4 billion kWh of electricity, which would be sixteen times the amount made by the Hoover Dam. It might yield in addition a gross income of \$143 million for its product. Floods would no longer plague Central China since the reservoir’s carrying capacity would be “sufficient to control the largest flood on record.” The dam’s flood-prevention capabilities would increase agricultural land use, since the dikes then crisscrossing Hubei and Hunan provinces would no longer be needed to contain the Yangzi River’s seasonal surges. Local water inputs could instead be channeled from the dam’s reservoir, thus irrigating ten million acres of agricultural land and engendering an agricultural stimulus that would, Savage predicted, contribute \$37 million to China’s annual GDP.

The water from the TGD could, he thought, also be piped to 10 million urban residents and “provide an excellent supply of clean domestic water.” Regional transportation patterns would undergo significant changes too. “Ocean-going vessels” would “ply inland at least to Chungking,” thereby promoting the economic growth of inland China. Regional annual freight traffic would go up by 33.2 billion-ton miles, and regional freight costs would go down by \$192 million.⁵² As a result of this panoply of economic transformations, China would “change from a weak to a strong nation.”⁵³ The realization of this monumental change was, however, not assured if China relied on its own means. The Chinese government had to partner with the TVA and the U.S. Bureau of Reclamation to build the Three Gorges Dam.⁵⁴ Only then could the miracles of modern American engineering bring industrial modernity to China.

Conflicting views

Some within China responded negatively to Savage’s plan. When American-trained engineer Zhang Guangdou learned about it, he wrote a letter to the Vice Director of the NRC, Qian Changzhao, to explain why it should not be pursued. First, China was at war, which would seem to negate such a massive project. Second, American loans would be insufficient to cover construction costs, leaving China with either having to foot the rest of the bill or end up with only a partially completed project. “Even if the dam were finished,” Zhang stated in his memoirs, “there was no way that the electrical energy generated could be completely utilized, because our country does not have the financial strength to build the industrial and agricultural projects that would require it.”⁵⁵ Lastly, the Three Gorges Dam would occupy top priority in China’s economy, and thus to grant the United States technical authority would impinge on Chinese sovereignty. Qian

⁵¹Savage, *Preliminary Report*, 5-6.

⁵²Wanli, *Sanxia gongcheng*, 114-118, 120-121.

⁵³Savage, *Preliminary Report*, 2-4.

⁵⁴Wanli, *Sanxia gongcheng*, 120-121.

⁵⁵Zhang, *Shuili taidou*, 44-45.

Changzhao sympathized with Zhang's viewpoint, and yet he did not back him up in policy circles. Qian most likely remained silent out of deference to Chiang Kai-shek, who was a firm supporter of the project, as we have discussed.⁵⁶

At the time, China's economic, political, and military situations were becoming increasingly dire. Inflation ballooned, and more and more of the Chinese public saw the GMD regime as ineffective at handling economic issues and incompetent at defending China against Japan.⁵⁷ To shore up the government, Chiang Kai-shek sought American sponsorship. One of the people he aimed to elicit support from was the Director of America's War Production Board Donald Nelson, whom President Roosevelt assigned to oversee economic planning for America's war efforts. During Nelson's visit to China in September 1944, Chiang proposed that the United States assist with setting up an organization like the War Production Board in China – also that Nelson be appointed as its head.

Chiang's suggestion was clearly a scheme to increase American participation in Chinese state-led development since the NRC already had more authority over the national economy in GMD-run areas than the U.S. War Production Board. Chiang's strategy worked. Nelson carried his message back to Washington, gained Roosevelt's approval, and returned to Chongqing to talk with Chiang Kai-shek and other leading Chinese officials about precise arrangements. At one of Chiang's and Nelson's meetings, Chiang offered that, if Washington agreed, then the dam would be named after Roosevelt.⁵⁸

While Chiang's name-bestowal gesture to Roosevelt does not appear to have impacted the White House's decision-making, employees of the U.S. Bureau of Reclamation did view the dam as an opportunity to have their bureau's name attached to one of the biggest hydroelectric projects of all time. By putting to work their technical and scientific management of waterways, Bureau staff contended that they would gain an understanding of "more intricate engineering problems" which could be repurposed to advance hydroelectric development at home in the States. The American economy would further benefit from the dam's construction because the Chinese government would have to buy from the United States "great quantities of equipment and fixtures which American manufacturers will be glad to supply."⁵⁹

The State Department, on the other hand, was reticent to greenlight the Bureau's involvement in the Three Gorges project, because "It would tie up capital in a development of power beyond the capacity of Chinese industry to utilize within the foreseeable future," and because the GMD had not thought through how the dam would concretely contribute to the "general progress of industrialization."⁶⁰ Due to these significant issues, the State Department did not fully back American participation in the dam's construction. The Bureau's pleadings were, nevertheless, not entirely in vain. The State Department's leadership agreed to the Bureau's signing of a contract with the NRC, but only for preparatory work. According to the contract's terms,

⁵⁶Ibid., 44-45.

⁵⁷Lary, *Chinese People*, 152-162.

⁵⁸Zhang, *Minguo sanxia*.

⁵⁹Sneddon, *Concrete Revolution*, 41, 43. The quote is on page 43.

⁶⁰Sneddon, *Concrete Revolution*, 42.

a group of American engineers, led by John Savage, would supervise the Three Gorges project.⁶¹

After signing the contract, a Chinese delegation headed up by Premier Song Ziwen traveled to Washington to hammer out the details. During their meetings, the United States consented to loaning China \$1.3 billion to cover the costs of building a 220-meter-high dam and an associated fertilizer plant. It was envisaged that the dam would yield several benefits. It would enhance regional transport, produce 10.64 gigawatts of electricity, and drastically reduce China's electricity costs. A portion of the electricity would go to the dam's associated fertilizer plant, half of whose output would be shipped to the United States to pay off China's loan. The rest of the fertilizer would go into Chinese agriculture, whose industrialization would be further stimulated by the 900 billion cubic meters of water channeled to farmlands.⁶² The entire project would take an estimated ten years to complete. But after six years the dam would begin to generate electricity for central and western China and be able to prevent regional floods and distribute water to local cities, industrial facilities, and agricultural lands. Once completed, the dam would generate an estimated \$510 million dollars of profit per year.⁶³

In accordance with the project's contract, the NRC posted experts to the Bureau of Reclamation's headquarters in Denver to elaborate the precise contents of a regional development plan. Chinese participants included recent graduates of American universities 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 his Bureau of Reclamation colleague John Cotton as its director and hired other experts from the TVA, the Coulee Dam, and the American military. The NRC included domestic Chinese engineers as well, to have them gain experience.⁶⁴

Diverging opinions and geopolitical directions

As American and Chinese engineers on both sides of the Pacific began planning for the Three Gorges Dam, conflicting views in both the United States and China continued to ask whether the dam should be built. In favor was some of the American press that viewed the Three Gorges project as a way to spread American influence abroad at a critical point in Asian history. The region had been ravaged by World War II and needed economic regeneration by technological expertise. Otherwise, there was a significant risk of revolution sweeping the region and the flames of war further devastating Asia with political disorder and economic upheaval.⁶⁵ China was in a particularly troubling situation. Not only did China have to deal with the harsh legacy of World War II, it also had to face, in the *Christian Science Monitor's* words, "the tyranny of famine and flood" that had kept "China in bondage for millennia."⁶⁶ If

⁶¹Meiguo, "Meiguo kengwujū," 147-149; Wanli, *Sanxia gongcheng*, 260.

⁶²Zhang, *Minguo sanxia*, 136-137.

⁶³*Ibid.*, 136-137.

⁶⁴Wanli, *Sanxia gongcheng*, 262-263.

⁶⁵Ekbladh, "'Mr. TVA,'" 346-351. On America's enduring faith in the power of technology to solve political problems, Nye, *American Technological Sublime*.

⁶⁶Stanford, "Uncle Sam," 2.

the United States did not address this highly combustible situation, then as the *New York Times* noted, “the starving East, home of two-thirds of the earth’s people” would present “a standing invitation to rivalry among the great powers, handicapping the whole world in its search for a lasting peace.”⁶⁷

The United States was working to advance global peace by putting to good use America’s unequaled technical skills in planning for the Three Gorges Dam. Just like America had done with the Tennessee Valley Authority, engineers from the U.S. Bureau of Reclamation would employ their technical ingenuity and expertise in economic planning to radically improve the economic geography of a whole region. Yet the changes sown by China’s Yangzi Valley Authority would be even more transformative than its American precursor. Contained behind a wall of concrete, the Yangzi’s liquid power would facilitate pushing the country out of its poor war-scarred state to becoming an advanced industrial nation.⁶⁸ Key to this epochal transition were the power lines emanating from the dam which would bring energy to a population larger than the entire United States. The industrial progress that the TGD would usher in would not be short lived. It would be America’s enduring technological contribution to China’s economic rise. For, as the *New York Times* foretold, “Long after the Great Wall of China itself had crumbled away, the Yangtze Dam would continue to spread its abundance over a smiling China.”⁶⁹

Some members of the Chinese media were also highly positive about how the Three Gorges Dam would change China. Some openly declared the TVA as a model of regional planning that China ought to imitate and praised Savage’s plan as “the highest expression of human knowledge and technical skill,” whose implementation would transform China from an impoverished agricultural nation into the other leading industrial country on the Pacific.⁷⁰ Although the TGD was cut from the same developmental cloth as the TVA, its impact on China’s industrial future would be even greater. It would earn higher profits, put a lid on the Yangzi’s larger floods, solve the age-old problem of transporting goods in and out of Sichuan, and churn out walloping volumes of electricity. This big injection of energy into the national economy could electrify the countryside and power a plethora of new factories, mines, and railroads that would herald in a new industrial age in China and significantly raise people’s living standards. With so much energy pulsing through the national economy, both urban and rural homes would soon be equipped with lights, refrigerators, electrical stoves, and radios, and the sound of whirring motors would be audible all over the country.⁷¹

A certain critic of the Three Gorges project, Lu Shuo, held a diametrically different opinion of the dam’s consequences. His criticisms partially echoed Zhang Guangdou’s worries. In Lu’s view, since China did not have the ability to independently accomplish such a large industrial endeavor, it would have to rely heavily on technical and economic aid from the United States, which had the raw materials, industrial equipment, and experience in regional planning that the Three Gorges project required. Leaning so extensively on the United States would cause China to incur a hefty financial

⁶⁷Espy, “Dams for the Floods,” 121. I take the expression “liquid power” from Swyngedouw, *Liquid Power*.

⁶⁸“TVA Becomes Engineering Schoolroom,” 3.

⁶⁹*Ibid.*

⁷⁰Li, “Sanxia shuidian,” 26.

⁷¹*Ibid.*, 26-30.

obligation to Washington that it would take twenty-four years to pay back.⁷² Up to this point, Lu's criticisms overlapped with Zhang Guangdou's.

He raised other concerns, however. Even with American assistance, it was questionable if the Chinese government bureaucracies could see through the plans: they would have to become more technocratic, like the TVA, and not be subject to narrow political struggles. If these conditions were not met, then it would be impossible to create and implement regional development plans that could actually operate a large electrical system. Last but not least, Lu urged the national government not to act in an authoritarian manner and impose the project by fiat. The central government had to take a democratic approach and convince people to relocate, so that the dam could be built. People who moved should also receive reasonable government compensation for their property losses. Otherwise, they might cause political problems.⁷³

While critics of the TGD pointed out the political and economic problems that its construction might cause, administrators and technicians assigned to drawing up plans for the dam had to worry about a more mundane issue. They did not have enough geological information to begin work. When Savage drafted his initial plans for the TGD, the survey data he collected was far from adequate, and so additional surveys were needed. Head planners were, however, located in Nanjing and Denver. To obtain the data, they had to send survey teams to the Three Gorges region – a slow process. Top project planners therefore had to wait for months before receiving survey results.⁷⁴

An even bigger problem was the looming political uncertainty created by the ongoing Chinese Civil War between the GMD and the CCP. World War II alone had devastated the GMD's finances, but the Civil War had driven finances even closer to ruin. By 1947, the Chinese government's finances were so bad that the GMD lacked the means to pay for American goods and services, and so the NRC informed the U.S. Bureau of Reclamation that China was suspending the Three Gorges project. A subsequent report talked about reviving the dam when funds became available.⁷⁵ The latter report was prescient, since the GMD government would soon lose the Civil War. Once China's political shape was reconfigured under a Communist regime, and finances began to stabilize, especially with aid arriving from the U.S.S.R. by the early 1950s, Chinese government efforts to build the Three Gorges Dam were started back up.

Conclusion

When Sun Yat-sen first put forward the Three Gorges Dam project, it far exceeded China's fiscal, technical, and administrative capabilities. These constraints did not deter Sun, who advocated an economic approach that inspired the ensuing Republican-era work on the TGD. For China to overcome its domestic insufficiencies it had to obtain foreign associates with leading technological expertise,

⁷²Lu, "Cong meiguo," 16.

⁷³Ibid.

⁷⁴Wanli, *Sanxia gongcheng*, 267-265.

⁷⁵Ibid., 275-281.

industrial equipment, and managerial knowhow who might re-design the entire Three Gorges region into a hydroelectric engine for national development. Moreover, both China and the potential foreign experts would gain from the partnership. With the Yangzi subdued by a Three Gorges hydropower station, flood waters would be tamed, interregional trade would grow, electrical energy would stream into industrial projects nationwide, foreigners would gain increased access to China's markets, and local demand for foreign goods would expand greatly. The problem was that no foreigners were interested in sponsoring such a mammoth endeavor when China was wracked by civil war, and western elites had major reservations about their Chinese counterparts' abilities.

When the GMD formed a new central government in 1927, it sought to fulfill Sun Yat-sen's technocratic dream for China. It was, however, only in the wake of the 1931 Yangzi flood that central party leaders ordered a Three Gorges survey to determine how the state could control the river for national development. Although the project assessment spoke highly of the TGD's potential contributions to China's economy, national integration, and ending regional floods, they questioned how it could succeed, given the limited industrial and fiscal bases and the lack of local power demand. Eventually, In the mid-1930s the GMD shelved the Three Gorges project, with the added stress of warfare against both the CCP and the Japanese invaders.

Japan's assault on Pearl Harbor revived the GMD's efforts for the TGD, especially since the U.S. had come to see China's national security as intertwined with its own and dedicated far more attention to Chinese development than ever before. While GMD leaders viewed the Three Gorges Dam as a means to lock in American guarantees to substantially support China's industrialization, American engineers considered the project to be a way to solidify their international status as engineers and support America's new role as global leader. Although some U.S. State Department personnel questioned whether a war-weakened and poor China should allocate so many resources to a giant infrastructure project, Washington nonetheless approved a massive loan to China to pay for it, and endorsed sending American experts and industrial machinery.

American boosters extolled the decisive impact that would result. The massive concrete walls would end a major source of China's age-old flooding problem, and the colossal flows of energy would turn the Yangzi River valley into an agro-industrial garden, thereby ending China's cycles of famine. The plentiful power supply would propel China's economy out of its war-shattered, revolution-prone condition onto a path of peaceful industrial growth, rising living standards, and expanding demand for American products. Chinese supporters of the dam foresaw its power to set into motion a new industrial epoch in which electricity was an integral part of everyday life, factories sprouted everywhere, and China became an advanced consumer society.

The dam's detractors expressed concern about the nation's incurring heavy debts to the United States and becoming too subject to its political and economic influence, portraying the Three Gorges project as a sort of American "debt-trap diplomacy" *avant la lettre*. Some doubted the GMD's capacity to pull off such an enormous endeavor while it was riven by factional conflicts, and had not achieved

large public backing, with China's finances concurrently in freefall. In the end, it was China's terribly troubled economic situation and the CCP's military triumph over the GMD in the Chinese Civil War that terminated the Sino-American dream surrounding the TGD.

After the GMD fled to Taiwan, it continued to pursue its technocratic aspiration of building hydropower dams to industrially strengthen the Chinese nation, and the United States government continued to assist the GMD with making its hydraulic dreams come true, sending in the U.S. Bureau of Reclamation to collaborate on several hydroelectric projects in Taiwan.⁷⁶ The Bureau's activities also were expanding beyond Taiwan; in fact, the United States came to view hydraulic infrastructures worldwide as an integral part of a geopolitical mission to stamp out communist revolutions and to keep nations on America's side in the Cold War.⁷⁷ Across the Taiwan Straits, the CCP also understood the expansion of national hydraulic infrastructure to be one of their fundamental political objectives. But its leaders saw this goal as a central component of building a China that was independent of the capitalist West.⁷⁸

Like the GMD, CCP leaders under Mao came to see the TGD as the ultimate realization of their industrial dreams. Yet all their attempts to materialize it faced the same nagging problem that the GMD had encountered before them. Accomplishing the titanic feat of damming the Yangzi River in the Three Gorges region was far beyond the administrative, financial, and technological wherewithal of Mao's China. The Chinese Communist Party, however, understood this difficulty not as an insurmountable obstacle, but rather, as Sun Yat-sen thought, merely an economic engineering problem that could be solved through state-led development in collaboration with international partners. After decades of rebuilding China's industrial base, its managerial skills and fiscal capacity, the CCP was finally able to fulfill at the turn of the twenty-first century the nearly hundred-year-old Chinese techno-political dream of "walls of stone" making a "smooth lake" rise in the Three Gorges region and developing the Yangzi into a powerhouse of China's national rejuvenation.⁷⁹

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⁷⁶"Year of the Big Dam," *Taiwan Review*, September 1, 1963, <https://tinyurl.com/yxqfflx3>; Lin Bingyan, "Wushu huo jishu," December 18, 2008, <https://tinyurl.com/y4ju8xe5>.

⁷⁷Sneddon, *Concrete Revolution*, 52-124.

⁷⁸Pietz, *Yellow River*, 130-257.

⁷⁹Mao Zedong, "Swimming," *Marxists Internet Archive*, <https://www.marxists.org/reference/archive/mao/selected-works/poems/poems23.htm>.

Glossary

Chiang Kai-shek	蒋介石
Lu Shuo	陆朔
Qian Changzhao	钱昌照
Shenbao	申报
Song Xishang	宋希尚
Song Ziwen	宋子文
Weng Wenhao	翁文灏
Yichang	宜昌
Yun Zhen	恽震
Zhang Guangdou	张光斗
Ziyuan weiyuanhui	资源委员会

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