

Three Gorges Dam

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The Three Gorges Dam project, the world's largest engineering venture, will harness the mighty Yangzi (Chang) River and supply China much needed hydroelectric power. But the costs of the project—financial, environmental, political, and cultural—have many people questioning its true worth to China and the world.

The Three Gorges Dam project is the world's largest engineering feat and the largest in China since the building of the Great Wall. Electricity generated by the dam will meet almost 10 percent of China's requirements. But the project has forced the relocation of 1.3 million people, drowned valuable farmland, and destroyed ancient settlements of historical and cultural importance. Declining water quality resulting from submerged industrial sites, increased landslide risk, biodiversity decline, and accumulating silt are unresolved problems. The full impact of the dam on China is yet to be realized.

Old Dream

For centuries Chinese emperors and dictators dreamed of building a great wall across the Yangzi (Chang) River. This cradle of Chinese civilization originates in perpetual snows of the lofty Qinghai-Tibet Plateau. It flows southward across treeless plains before dropping 4,000 meters (13,123 feet) into the deep valleys that separate

Sichuan from Tibet. Near Yibin the river enters the fertile Sichuan Basin, where the Minjiang, Tuojiang, Jialing, and Wujiang Rivers—just four of more than seven hundred tributaries—swell its size. Beyond the industrial city of Chongqing, the Yangzi slices through limestone strata of the Wushan Mountains to create a spectacular 200-kilometer (124-mile) section of narrow and precipitous gorges: Qutang, Wuxia, and Xiling. Beyond these celebrated Three Gorges, the river spills onto the fertile Yangzi Plain at Yichang and meanders to the Pacific Ocean. At 6,276 kilometers (3,900 miles), the Yangzi is China's longest river and the third longest in the world, behind the Nile and Amazon. The watershed covers 19 percent of China's total landmass.

As one of Asia's most emblematic landscapes, the Three Gorges of the Yangzi River figure prominently in Chinese cultural lore. Although local water diversions date to the Han dynasty (206 BCE–220 CE), modern China's revolutionary founder, Sun Yat-sen, first proposed damming the river in 1919. During the 1940s the United States Bureau of Reclamation cooperated with the Chinese to explore potential dam sites and evaluate costs and benefits. The Chinese civil war (1945–1949) derailed these plans until the 1950s, when the victorious Mao Zedong, leader of the Chinese Communist Party, revived the idea, although political and economic problems again trumped construction. In 1992, with the urging of Chinese Premier Li Peng, a trained engineer, the National People's Congress approved the plans by the smallest margin in the history of that normally compliant legislative body. Construction on the \$25 billion project started in 1994 at a site below the Three Gorges in central Hubei Province.



A view of the Three Gorges Dam, the world's largest feat of engineering, which will supply China with much-needed hydroelectric power when fully operational in 2009.

The World Bank declined support, citing major environmental and human rights concerns. The closing of diversion gates in 2006 promoted nationalistic pride. The government predicts that the full hydropower complex will operate by 2009.

The concrete gravity dam at Three Gorges is the world's largest engineering feat and the largest in China since the Great Wall. It consumed record amounts of soil, steel, and concrete. It also forced relocation of a record 1.3 million people. The project continues to generate unprecedented domestic and international controversy, fanned by the concurrent evolution of digital communications and emerging supranational environmentalism. The controversy stems from environmental and human rights concerns.

Environmental Challenges

Declining water quality in the Three Gorges Reservoir quickly emerged as a major problem. The rising waters submerged 1,600 industrial enterprises (factories, mines, and waste dumps) that retained tons of unmitigated hazardous waste and other pollutants. Added to this waste is ongoing waste from municipal, agricultural, and industrial enterprise that continues to flow unrestricted into the reservoir. Whereas the free-flowing Yangzi once

diluted and transported pollutants downstream, trapped chemicals now trigger algal blooms that contaminate municipal drinking water and kill fish. A recent bloom in Fengdu County, for example, tainted domestic water for fifty thousand people.

Landslides are another major problem. The rising waters exert pressure on unstable hillsides that encircle the 5,300-kilometer (3,293-mile) shoreline. Seepage into rock joints weakens the steep slopes. Hundreds of slides occur each month, although Chinese officials overseeing the project insist the new reservoir does not promote instability. In 2007 a landslide just upstream from the Three Gorges Dam crushed railroad workers and a bus, killing more than thirty people. More slides are expected as the reservoir rises to a maximum expected height of 175 meters (574 feet) in 2012.

Trapped silt behind the static reservoir waters presents two problems. Silt deposited during floods in the lower Yangzi Basin now settles in the reservoir floor. Accumulating silt is already reducing the hydropower capacity of tributary dam projects, and planners expect sedimentation to become an issue within twenty years near the city of Chongqing at the upper end of the reservoir. Furthermore, although the dam should reduce catastrophic downstream flooding, it will also block much of the silt that has enriched the lowland soils for centuries and was the source material for the natural levee system.

As a result agricultural productivity in the lower Yangzi basin may suffer from the loss of flood-deposited silt.

Scientists are also monitoring riparian (relating to the bank of a natural watercourse) and aquatic biodiversity loss resulting from the changes in the flood regime, water temperature, and water chemistry.

The potential for an earthquake-induced failure of the dam itself also exists although the dam has been built to withstand large earthquakes. The dam survived the massive 7.9 Richter scale quake in May 2008 and the subsequent aftershocks. But there is some speculation that the dam itself may have caused the quake. A phenomenon known as reservoir-induced seismicity occurs when the sheer weight of water in a reservoir causes tectonic plates to shift, resulting in an earthquake.

Human Cost

The Three Gorges reservoir inundated 17 cities, 109 towns, and more than 1,500 villages, forcing permanent relocation

of a 1.3 million people. Resettlement began in 1997 and is four times greater than any prior infrastructure resettlement program in world history. The government was not prepared to manage or mitigate the three-pronged humanitarian crisis resulting from forced displacement, labor dislocations, and the more recent unanticipated dislocation of people fleeing landslides. Moreover, this ancient and densely populated land offered few places for resettlement, especially of farmers, who comprised half the number. As population density in resettlement zones increased to double the national average, farmers pushed higher into steep and less fertile hillsides where forest clearing contributed to slope instability. Resettled people had little involvement in policymaking and relocation decisions. Many were forced to change livelihood and move far away from their former homes. Those resettled face unemployment and poverty rates higher than those of people who were not removed, and one-third live in severe poverty. Insufficient government compensation for this loss of land and livelihood is magnifying the crisis although an effective state security apparatus minimized both refugee flight and

Boats on the river at the Three Gorges Dam, which forced the resettlement of more than 1.3 million people.



vocal resistance. In 2007 the Chongqing municipal government decided to relocate an additional 4 million people as a result of new slope instability problems.

The reservoir is also destroying thousands of cultural and archaeological sites, including temples, hanging tombs, and historic landmarks. Evidence of human habitation in the area dates to the Paleolithic era (2 million–10,000 BCE). Many sites in newly depopulated areas are looted before underfunded government teams arrive to catalog and remove the artifacts.

Benefits versus Risks

The government believes that the benefits of the Three Gorges Dam exceed the environmental and social challenges. When the twenty-six generators reach full operational capacity in 2009, the 8,200 megawatts of power will meet almost 10 percent of current Chinese requirements and be the largest source of clean, renewable energy in the world. It may also temporarily curb the millennia-old problem of downstream flooding, such as the 1998 event that killed thousands. The placid reservoir now allows 10,000-metric ton freighters to safely navigate 2,250 kilometers (1,398 miles) inland from Shanghai, free of the treacherous shoals and strong currents of the once-untamed Yangzi River.

The project gave birth to a nascent Chinese environmental movement. An unexpected twist occurred in June 2007 when Chinese Premier Wen Jiabao publicly announced that solving the environmental problems created by the Three Gorges Dam should be a national priority. It remains to be seen how the government and the Chinese people will adjust to the economic, environmental, and social changes—good and bad—of the world's largest engineering project.

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Further Reading

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