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Earthquake Repercussions Spur Rethinking of China's Dam Building Strategy

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One of the tragic ironies of the recent earthquake in China is that it has created numerous new, extremely dangerous dams in a country that already is the most dam-populated country on earth. At more than 85,000 dams and counting, Chinese leaders already boast of having the tallest dams, the largest by reservoir capacity, the dam with the highest ship lift, and the most powerful electricity producer. From arch dams, earthen dams, and gravity dams to cascade and concrete-faced rockfill dams, China has it all.

Now, in the wake of the May 12 Sichuan quake, China has more dams than it may be able to handle. The new dams in question are the so-called "quake lakes"—34 at last count, of which 28 threaten to burst (China Daily, June 1). These quake lakes have been created by massive landslides into China's river system. The landslides are serving as perverse "natural" dams; behind these quake lakes, water is rapidly building up.

The clear and present danger is a subsequent breach that sends a flood of water hurtling toward villages and towns downriver. In the worst case scenario, this flood of water would, in turn, knock out other dams damaged by the quake and create a disaster every bit as damaging as the original quake. After the quake, as many as 391 hydroelectric dams in five provinces are in "dangerous condition," stated the National Development and Reform Commission, the nation's top economic planning agency. As an indicator of the severity in some situations, Tan Li, the Communist Party secretary of Mianyang and head of the city's earthquake control and relief headquarters, ordered that 1.3 million people should evacuate the area and move to higher ground (Xinhua News Agency, May 30; China Daily, June 1).

Quake lake bird's eye view

In fact, China is no stranger to such dam disasters. Exhibit A for such a problem is the Banqiao Dam, which was originally built in the early 1950s. When cracks were found in the dam and its sluices, they were dutifully repaired and reinforced by Soviet engineers, after which the Banqiao was dubbed the "iron dam." Like the Titanic, it was supposed to be indestructible. Then, in 1975, Typhoon Nina hit.

In just a few short days, Nina rained down a mind-boggling 63-inch deluge. At times, it poured 6 inches per hour. Under this onslaught, the smaller, upriver Shimantan Dam broke first and sent a wall of water crashing down toward the "indestructible" Banqiao. Half an hour later, the Banqiao was crested and collapsed. 20 foot high waves rushed downstream at speeds of up to 30 miles per hour. In the process, these waves wiped out 60 more dams along the way.

The death toll from the Banqiao collapse was staggering. More than 200,000 people died—a third from the initial flooding and the rest from famine and disease as the breach effectively isolated millions of people from basic communications and transportation networks.

In fact, in the wake of this recent earthquake, Beijing would do well to rethink its propensity for discretionary dam building. This strategy is putting hundreds of millions of Chinese citizens located along China's river banks at extreme risk from a whole host of avoidable dangers.

It should be noted here that despite a rich and ancient history, dam construction in China did not really begin on a widespread scale until the Communist revolution, since only 22 large dams existed prior to 1949. All that changed beginning with the Great Leap Forward (1958-1960). Although this period is best known for the calamities it wrought in trying to jump-start China's steel and manufacturing industries, it also marked the beginning of China's thoroughly myopic quest to be the dam capital of the world. Within 40 years, as part of a broader campaign to conquer nature, Mao's cadres had dammed every major river in China, building more than 80,000 dams of various sizes in the process.

A Disaster in Waiting

Today, the poster child for China's highly risky dam strategy is the controversial Three Gorges Dam project—the largest hydroelectric plant on the planet. This project was fiercely opposed by scientists and environmentalists both within and outside of China. It is now the world's biggest environmental catastrophe in the making.

China's "Great Wall on the Yangtze" stands more than 600 feet tall, is almost 400 feet wide at the bottom, and stretches almost a mile and a half across the river. What is most impressive, and potentially most dangerous, about the dam is not its height and width, but rather the mammoth reservoir that the dam has created. This is a reservoir that is 400 miles long and 70 miles wide and holds five trillion gallons of water—equal to one-fifth of all the freshwater consumed in the United States annually.

The Three Gorges Dam

Before filling this reservoir, the Chinese government had to relocate almost 1.5 million people. In fact, submerged beneath the surface of this reservoir are two Chinese cities, 11 Chinese counties, 116 towns, and 4,500 villages. Another aspect of the fierce political controversy surrounding the dam has been the loss of an abundance of archaeological and historical artifacts. In addition, there are more than 1,500 submerged factories—many with the capability of releasing all manner of toxins into the waters of the Yangtze.

At least for now, the Three Gorges Dam is delivering on its promise to provide an important new source of electricity for China. Over time, however, massive silt buildup behind the dam threatens to significantly cut the dam's electricity output, which is the Achilles heel of all large dam projects. Meanwhile, a myriad of other problems spawned by the dam are threatening to spin out of control. As one surprised government official has put it: "We thought of all possible issues, but the problems are all more serious than we expected" (Xinhua News Agency, September 26, 2007).

One such problem that graphically illustrates the law of unintended consequences is this: While the Three Gorges Dam was supposed to control flooding, it is now actually increasing flood risk and putting millions of Chinese living downstream at grave risk. Since the river now flows with much less silt, it also flows much faster. This faster-flowing river is, in turn, putting much more force on a set of dikes that have been built over the centuries to contain the river. The very real threat now is that some of these dikes will be gouged out by the rushing water, collapse and unleash a flood of water onto the cities and towns downstream.

Reduced silt flow downstream has also spawned another unintended consequence. Less silt also means the Chinese sunshine can penetrate deeper into the river. This increased sunlight is, in turn, accelerating the growth of photosynthetic algae and significantly adding to the epidemic of large scale algal blooms across Chinese waterways.

It is not just the waters downstream from the Three Gorges Dam that are suffering. The dam's reservoir itself is slowly, but inexorably, turning into a toxic, turbid stew as it traps more and more pollutants, sewage and garbage behind its "Great Wall" [1].

Three Gorges Dam Reservoir

Still a third unintended consequence of the dam is a rapid increase in the number of landslides. The land along the river banks once high and dry is now being waterlogged and loosened up by the reservoir. This, coupled with the enormous pressure of the water in the reservoir itself, is triggering landslides that have already produced waves over 150 feet tall that have dragged farmers to their deaths and drowned fisherman (Times [London], September 27, 2007).

Because of the threat of such landslides, it is widely believed that the government is being forced to relocate another three to four million Chinese people from the area. The Chinese government, however, denies that the relocation from southwestern Chongqing Municipality is due to the project but rather claims that the relocation "aims for local industrial restructuring and labor transformation," said Wang Xiaofeng, director of the office of the Three Gorges Project Committee of the State Council (People's Daily Online, November 27, 2007). Adding to the intense political turmoil surrounding these forced locations, some of these people will be "two time migrants" who were part of the original evacuation prior to the dam's construction. In addition, many people who were promised relocation funds have seen those funds siphoned off into the pockets of corrupt government officials (A "worst case scenario" is documented in People's Daily Online, July 27, 2007).

Beyond these horrific problems of increased flood risk, pollution and landslides, the dam is killing fish by blocking fish migration and huge mounds of rubbish are piling up behind the dam. This catastrophic scenario also hangs heavy over the Three Gorges Dam.

If silt were to rapidly build up behind the dam—a problem the Chinese government denies—eventually the dam would not be able to contain a flood crest and will surely be breached (People's Daily Online, December 7, 2007).

In fact, many other dams besides the Three Gorges are also deathtraps waiting to be sprung. According to a report by China's Water Resource Department cited in the Epoch Times, 30,000 of China's dams are in "critical condition," and they "threaten over 400 cities" and almost 150 million people. That same report indicated that "3,484 dams collapsed from the year 1954 to year 2003"—an average of 71 collapses annually (Epoch Times, July 12, 2005).

One of the reasons for the mishaps is sheer neglect. As China pours billions and billions of dollars more down the dam chute for ever-larger and shinier new projects, it continues to underfund even the most-basic maintenance and repair needs of many of its older dams—many of which were built with faulty engineering and cheap materials during the Mao years. As the section chief of the Shangrao City Water Resource Department Jian Xin points out: "The fundamental maintenance of the dams has been paralyzed" (Washington Times, July 15, 2005). In spite of risks, the fact that China has already invested 115.3 billion yuan ($16.6 billion) in the Three Gorges project as of September 2007, may serve as a strong deterrent for the planners in Beijing to halt and revisit the blueprint.

China's Dams Threaten Southeast Asia

In evaluating China's dam building strategy more broadly, it is useful to point out that this strategy is not just threatening Chinese citizens but also China's neighbors, such as Burma, Cambodia and Vietnam. In fact, China's upstream positioning on the Mekong River relative to its downstream neighbors, coupled with its overwhelming size and military might, has put China in a position to dam the Mekong with impunity.

China's grand Mekong River design will eventually include 15 large dams. The first two, the Manwan and Dachaoshan, were completed in 1993 and 2002, respectively. Together, they generate close to 3,000 megawatts of electricity—equivalent in output to about three large nuclear reactors.

The Manwan Dam

It is the third dam now under construction, however, which most alarms China's neighbors. When the Xiaowan Dam is completed in 2013, it will be as tall as a 100-story building, ranking as the tallest dam in the world, and will generate more than 4,000 megawatts of power.

The problems that China's mega-dams on the Mekong are likely to create are vast and far-ranging. The two dams already built have begun to affect the seasonal flow of the river. From the Chinese perspective, this is a good thing because it allows them to run large ships along the Mekong year round while at the same time preventing seasonal flooding. However, the downstream perspective differs decidedly.

To understand why, consider the likely impacts of China's dams on one of the world's most fascinating ecological treasures, the legendary Lake Tonle Sap in Cambodia. For much of the year, the lake is only a yard deep with a footprint of only a bit more than 1,000 square miles. During the rainy season, however, flow from the Mekong River helps deepen the lake to roughly 30 feet and increases the area of the lake more than five-fold. This turns Lake Tonle Sap into one of the best breeding grounds for fish in the world.

The obvious problem facing the Tonle Sap is that the China's mega-dams will even out the flow of water and thereby prevent the world's most fertile natural fishery from realizing its full depth and breadth in the critical fish breeding season. Already, fish catches have declined dramatically. In addition, the Mekong is now much more prone to rapid rises and falls as an upstream China regulates its own rivers, seemingly oblivious to the natural habitat and concerns of its downstream neighbors.

Tonle Sap wetlands

The nation most at risk from China's Mekong River dams may well not be Cambodia but rather Vietnam—the "last stop" of the Mekong on its way to the South China Sea. If anyone thinks that the mighty Mekong cannot go dry during certain periods of the year as it approaches Vietnam, remember that the once-mighty Yellow River in northern China now runs dry more than 200 days a year. Already, for the Mekong, the death knell has begun to sound. Government officials recently reported that the Mekong River had recorded its lowest level ever and that it was "flowing 'close to rock bottom'" near the end of its journey in Vietnam (Guardian [London], March 25, 2004).

In conclusion, Chinese officials will have their hands full coping with the aftermath of the Sichuan quake for some time. During this time, much of the media's focus will likely be on the corruption and neglect blamed for building the "tofu" schools where thousands of children perished in the quake. However, by highlighting the dangers of systematic dam failures, the Sichuan quake may also constructively trigger a rethinking of China's dam building strategy at the highest echelons of government. Such a rethinking is long overdue.

Notes

1. See, for example, Terradaily, September 21, 2006 and Xinhua News Agency, September 9, 2006. See also "Pollution has put Yangtze on brink of catastrophe," Times Online,

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