

# Scientists link dam to quake

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Nine months after a devastating earthquake in Szechuan province, China, left 80,000 people dead or missing, a growing number of American and Chinese scientists are suggesting that the calamity was triggered by a four-year-old reservoir built close to the earthquake's geological fault line.

A Columbia University scientist who studied the quake has said it may have been triggered by the weight of 290 million tonnes of water in the Zipingpu Reservoir, a little more than a kilometre from a well-known major fault.

His conclusions, presented to the American Geophysical Union in December, coincide with a new finding by Chinese geophysicists that the dam caused significant seismic changes before the earthquake.

Scientists emphasize that the link between the dam and the failure of the fault hasn't been conclusively proved, and that even if the dam acted as a trigger, it would only have hastened a quake that would have occurred at some point.

Nonetheless, any suggestion that a government project played a role in one of the biggest natural disasters in recent Chinese history is likely to be politically explosive.

The issue of government accountability and responsiveness has boiled over in China in the past year. Grieving parents of thousands of schoolchildren killed in the disaster have already made the 7.9-magnitude quake a political issue, charging that children died needlessly in unsafe school buildings approved by negligent or corrupt officials.

More public anger erupted last year when the government failed to prevent the sale of tainted milk powder that sickened nearly 300,000 children and killed six.

"Any kind of government-related disaster presently is very, very damaging and, politically, extremely sensitive," said Cheng Li, the China research director at the Brookings Institution.

If it is proved the earthquake was more than just a natural disaster, "the government will be very uncomfortable ... because of the whole issue of government accountability," Li said.



A Chinese nurse helps a youth trapped in Beichuan after the earthquake in southwest China's Szechuan province last May. The issue of government accountability has boiled over in China in the past year following the quake and the sale of tainted milk powder.

REUTERS, FILE

Questions about the Zipingpu Dam are especially delicate because China is building many major hydroelectric dams in the southwest, a region that has abundant water resources but is considered prone to earthquakes.

In a petition to the government in July, a group of environmentalists and scholars said the fact that government scientists had underestimated the risk of the May earthquake raised questions about a host of other dams built in the same valley and along five other major rivers, according to an article published by Probe International, an environmental advocacy group.

Chinese authorities have steadfastly dismissed any notion that reservoir-building in Szechuan province placed citizens at any added risk, and they have blocked some websites of environmental groups that suggest dangers have been overlooked.

In a December article in the Chinese magazine *Science Times*, two scientists from the Chinese Academy of Sciences strongly denied that the dam played any role in the earthquake.

Quake researchers worldwide have accepted that the quake was a purely natural disaster "because no reservoir-triggered quake with a magnitude eight has ever occurred in history," said Pan Jiazheng, an expert in hydroengineering, according to a translation published by Probe International.

Scientists generally agree that a reservoir, no matter how big, cannot by itself cause an earthquake. But Leonardo Seeber, a senior scientist with the Lamont-Doherty Earth Observatory of Columbia University, said the impact of so much water could hasten an earthquake's occurrence if

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*Cheng Li, China research director at the Brookings Institution*

geological conditions for a quake already existed. He said the best-known example was a 1967 earthquake triggered by the Koyna Dam in a remote area of India, with a magnitude of about 6.5 and a death toll of about 180 people.

Seeber said that while the link between the Szechuan earthquake and the Zipingpu Dam was not yet proved, work by Christian Klose, a Columbia University researcher specializing in geophysical hazards, suggested the stress caused by the water's weight might have hastened the quake by a few hundred years.

"It would have occurred anyway," Seeber said. "But of course the people who were affected might think the timing is an important difference."

Klose estimated that the weight of the water in the Zipingpu reservoir amounted to 25 times the natural stress that tectonic movements exert in a year.

The added pressure, he wrote in an abstract to an unpublished study, "resulted in the Beichaun

fault coming close to failure."

Fifty storeys tall and big enough to hold more than one billion cubic metres of water, the Zipingpu Dam astride the Minjiang River was billed as one of China's biggest water-control projects.

Officials said the \$750-million-US project, part of a grand plan to develop regions in China's south and west, would generate 760,000 kilowatts of electricity, irrigate farmland, help control flooding and provide more water to nearby Chengdu, a city of more than 10 million.

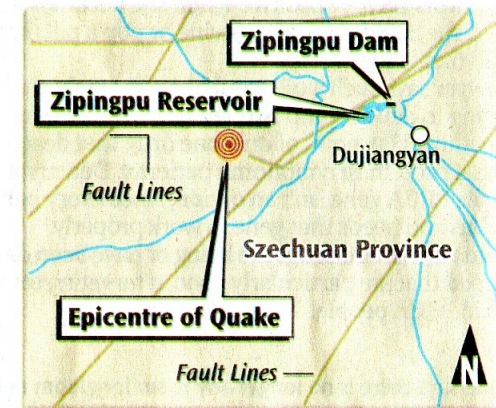
Almost as soon as construction got underway in 2001, one expert, Li Youcai, voiced fears that officials were underplaying the risk of a major earthquake in the region, but government officials rejected his argument, according to an article published last year on China Dialogue, a website devoted to environmental news.

Officials allowed the reservoir to fill with water in late 2004. Fan Xiao, a chief engineer with the Szechuan geology and mineral bureau, said data from late 2004 to late 2005 showed 730 minor earthquakes with magnitudes of three or less.

Last May's major earthquake originated 5.4 kilometres from the reservoir. The rupture in the Earth's crust stretched for 300 kilometres, initially moving in a direction that Klose said was consistent with the pressure from the water's weight.

Fan, the chief engineer for the regional geology investigation team, told reporters soon afterward that he believed that the reservoir influenced the timing, magnitude and location of the quake.

"The main lesson is that in building these kinds of projects we need to give more consideration to scientific planning, and not simply consider the electricity or water or the economic interests," Fan said.



RICK COLVILLE, THE JOURNALIST