Three Gorges Dam crisis in slow motion
By Peter Lee

Dams are big and stupid things. The Three Gorges Dam on China's Yangtze River is bigger and stupider than most, so it attracts a lot of criticism. Much of the criticism is deserved. Some of it - such as accusations that it has significantly exacerbated the drought gripping China - is, perhaps, undeserved.

All of the criticism, however, is an important harbinger of mounting political problems for China's authoritarian model of national development.

The Three Gorges Dam, or TGD, is very much the bastard child of the Tiananmen democratic movement of 1989 and the ensuing crackdown.

Popular activists, led by author Dai Qing, tried to stop the dam in the name of transparency, accountability and democracy. After Tiananmen, the Chinese government built and promoted the dam as a symbol of the government's determination to pursue economic development over political reform and in the teeth of international economic sanctions.

TGD was also a public vote of confidence in then Chinese premier Li Peng, who was at the time internationally excoriated as "The Butcher of Beijing" for ordering the crackdown. Li, trained as a hydropower engineer, was an enthusiastic advocate for the project, and allegedly had strong family as well as professional and public interest in the construction of the dam.

Because of its potent symbolism, negative reporting on the dam was actively discouraged in the Chinese national press for two decades.

Therefore, it was significant news when the State Council, China's cabinet, went public recently with the information that it was necessary to throw another 20 billion yuan (US$3 billion) or so at the Three Gorges in order to deal with landslide, pollution and relocation issues.

Most probably, the State Council announcement reflected the priorities of Premier Wen Jiabao. Wen, who is responsible for projecting the friendly, caring face of the Chinese government, has made it his priority to respond to popular dissatisfaction with bloated, destructive hydropower projects promoted by greedy local governments and powerful national utilities.
Famously, Wen pulled the plug on the Leaping Tiger Gorge Dam in 2008, after reading an investigative report by Liu Jianqiang in the Guangzhou-based Nanfang (Southern) Daily blasting the rogue project.

The Western press, however, decided not to spin the State Council announcement as "China's government makes a belated but welcome step toward transparency and public engagement by breaking silence on TGD problems".


In example of the bloggy "it would be irresponsible not to speculate" writing that news outlets increasingly turn to in order to fill their pages and attract readers, Elaine Kurtenbach of AP reported the allegation that "many villagers and some scientists suspect the dam ... could also be altering weather patterns, contributing to the lowest rainfall some areas have seen in a half century or more."

A modicum of research - ie recollecting that the Yangtze experienced one of the biggest floods in its history in the not-too-distant past, that is to say 10 months ago - casts doubt on this particular exercise in empirical inquiry.

The Yangtze River basin historically has a surplus of water, not a dearth, and this situation is likely to persist. Research on the effects of climate change on the Yangtze River basin predicts that global warming - not the TGD - will bring more rainfall in brief, more intense episodes from the summer monsoon. It was therefore undoubtedly a matter of considerable but not unexpected relief to the government as Xinhua reported that the drought broke under torrential rains - as much as 10 inches in some localities.

In a sure sign of the journalistic apocalypse, it fell to China's leading purveyor of knuckleheaded nationalism, Global Times, to provide some useful perspective on the purported TGD/drought link: it interviewed Zhang Boting, deputy general secretary of the China Society for Hydropower Engineering, obviously a hardcore dam enthusiast.

Zhang harrumphed:

It is absurd. There are more than 20 dams in the world larger than the Three Gorges Dam. But I never heard of them causing droughts. The big flood last year could be a good refutation of this claim. It is impossible for it to cause both drought and flood. [4]

Beyond straw-man issues of climate pseudo-science, the TGD operators did hog water last year in order to achieve the first-time fill of the reservoir to the 175-meter maximum, on the not unwarranted but unfulfilled assumption that spring rains would cover the
temporary downstream shortage.

The government subsequently admitted that the large, shallow lakes that form flood basins in the middle Yangtze - particularly Boyang and Dongting Lakes - were lower than usual as a result and dried up dramatically during the unprecedented drought, exacerbating local hardships.

There is also the issue of whether the reputedly greedy and callous operators of the TGD hydropower station resisted releasing drought-relief water from the dam so that optimum head for power generation (and profits) could be maintained. They probably did, and it took a highly publicized directive from the Chinese government to open the floodgates and send 3.7 billion tonnes of water (about 10% of the reservoir's capacity) downstream.

But this is an operational issue - and the practical assistance the release provided to (and the woes the late 2010-early 2011 reduced flows inflicted upon) the Yangtze's vast drought-crippled middle and lower reaches is questionable.

The underlying fact is that the dam gives Chinese planners additional flexibility in managing storage and release of water to adapt to extremes in rainfall and drought.

The prognosis for China, therefore, is more dams, not fewer, as Dr John Yin, a hydrologist at the University of San Diego, told Asia Times Online:

I believe that these recent extreme events will provide ammunition to those who want to build more large dams for increasing storage capacity to handle flooding and/or water shortage problems.

Disregarding the drought red herring, the past history and present circumstances of the Three Gorges project point to important structural issues for China's politics and economy, including problems that neither the projects supporters or critics originally anticipated.

Public policy advocates, like generals, sometimes find themselves refighting the last war instead of understanding and mastering the current battlefield.

The previous Waterloo of Chinese hydrology was the San Men Xia Dam, a gigantic failure for which Chairman Mao and his immense hubris were directly responsible. Built on the Yellow River with Soviet assistance in the 1950s and desperately and expensively repaired by China alone in the 1960s, it consumed a disproportionate share of the national budget and served as a drag on economic growth.

Improperly sited and designed, the dam's reservoir silted up almost immediately. Rivers feeding the reservoir slowed and dumped their sediment, raising beds and increasing flood risk. Within months, Shaanxi's capital, Xian, faced the real threat of inundation in the next major flood.
Hundreds of thousands of people were displaced from rich Shaanxi farmland and relocated into hopeless desolation. Their 50-year struggle to return and obtain fair compensation and treatment is documented in Xie Chaoping's samizdat epic, The Great Relocation. [5]

History looked primed to repeat itself with the Three Gorges Dam, a dream of Sun Yat-sen's that had been adopted as the Chinese Communist Party's national priority in the 1980s.

As political ferment and demands for more transparent and responsive government swept China in 1989, Dai Qing elevated opposition to the TGD to a national crusade. She prepared a compendium of articles and interviews titled Yangtze! Yangtze! to distribute to delegates to the National People's Congress and support efforts to block construction of the dam. The book was suppressed and Dai was imprisoned for several months post-Tiananmen.

Yangtze! Yangtze! was a carefully researched brief designed to demonstrate that citizen activists could do a better job of guiding China's hydraulic policy than the bespoke hacks in the Ministry of Water Resources. Its case against the dam touched on many issues, but primarily invoked the San Men Xia fiasco on the issues of unsupportable cost and catastrophic sedimentation.

Dai was wrong about the cost of the dam construction hindering China's growth. China not only built its dam; over the next 20 years, it was also able to over-invest in virtually every civil and industrial asset known to humankind.

The Chinese government also demonstrated it could deploy significant technical, financial, and political resources on the construction of enormous and successful dams throughout China, implying the capability to manage the critical problem of TGD sedimentation.

In 1993, Dai Qing interviewed Huang Wanli, the only Chinese hydrologist brave enough to buck Chairman Mao and his coterie and refuse to endorse the San Men Xia dam during its approval phase. He told Dai that Three Gorges, unlike San Men Xia, was located in a "scouring" zone rather than a "deposition" zone.

In other words, the TGD reservoir could theoretically be flushed out with intermittent high flow release of sediment-laden water. However, as a practical matter, the coarse gravel and rocks carried through Sichuan in the Yangtze could not be flushed out because of their size and weight, and the reservoir would silt up. Then, in a replay of the Xian crisis, Chongqing's port of Jiulongpu, near the west end of the TGD reservoir, would become unusable within 10 years.

The jury is apparently still out on the sedimentation issue. And China's government, in contrast to its frantic, underfunded approach to the San Men Xia debacle, is throwing a lot of resources at the Three Gorges problem before it becomes untenable. But things
don't look particularly good.

In 2004, environmental journalist Liu Jianqing penned an investigative report that stripped away much of the optimistic public relations façade erected by the Chinese government. He revealed that landslides were a much more severe problem than originally advertised, and the number of people who might have to be relocated from unstable parts of the reservoir might be double the original estimate and reach 2.3 million.

He observed that the series of five locks were a serious navigational bottleneck and not an economic panacea for the reservoir zone. The water in the reservoir was of filthy toilet quality. The much-touted relocation project - admittedly a vast improvement over the near-homicidal effort at San Men Xia - was failing many peasants through corruption, poor planning, and a shortage of economic opportunities.

Liu devoted most of the article to the existential issue: sedimentation.

I also spoke on the telephone to Li Changjun, deputy head of the planning section of Chongqing Transport Department. He said that the accumulation of sediment is "slowly becoming a reality" for Chongqing port. [6]

Liu also reported that the planned reservoir height of 175 meters -

the optimum for power generation - would create a crisis for Chongqing:

Rong Tianfu is on the Three Gorges project’s panel of sediment experts.

He is also a former chief engineer at the Transport Ministry's Yangtze Navigation Bureau, and was responsible for issues relating to Chongqing port. He told me that once the water level in the reservoir reaches 175 meters, due to the accumulation of sediment, Chongqing’s Jiulongpo port and Chaotianmen wharf will both become unnavigable.

As the reservoir bed rises, the city of Chongqing also becomes more vulnerable to flooding.

In 2010, the operating authority raised the reservoir level to 175 meters for the first time.

Dr Yin told Asia Times Online:

There are reports that the Yangtze River sediment discharge to the East China Sea has been significantly reduced in recent years for about the same amount of water, and that the river channel morphology is changing downstream of TGD due to less sediment being discharged. These are the evidences of sediments being held in the middle-upper reaches of the
river. However, whether the current observed sedimentation rates in the reservoir are higher or lower than the original estimates prior to the construction of the TGD is a question yet to be answered by the scientific community.

The operating authority cycles reservoir height to various levels up to 175 meters depending on flow and demand conditions. The fluctuations exert serious stress on the local geology and trigger landslides (exacerbating the reservoir's sedimentation woes and raise the threat of destructive mini-tsunamis), but might also alleviate the impact on Chongqing.

China's hydrologists also hold out hope that dam construction on the Yangtze's Sichuan tributaries will stem the flow of sediment into the reservoir. In a 2009 paper, researchers at the Nanjing Hydraulic Research Institute modeled sedimentation at Chongqing over 100 years with and without upstream reservoir construction. Outcome with reservoirs: pretty good. Outcome without reservoirs: not so good.

...[A]fter the construction of reservoirs in the upstream, [sediment deposition] reduces to 17 million cubic meters, only 10.3% [of the deposition without reservoirs. Without reservoirs] the Chongqing reach has severe deposition, which covers about 30% to 40% of the original river width... [7]

If anything is to be done to protect Chongqing's existing port, upstream reservoirs - and hundreds of millions of dollars - will be involved.

Despite the high-profile spiking of the Leaping Tiger Gorge Dam by Premier Wen Jiabao, construction of a series of dams on the wild Jinsha River is roaring along.

Also on the drawing board is another big dam just upstream of Chongqing. The Xiaonanhai Dam - enabled by the canny redrawing of the boundaries of an inconvenient wildlife refuge - will hopefully protect Chongqing at the cost of the last habitat of some fabled Yangtze aquatic life. Farewell, Yangtze sturgeon! Farewell, Zaijian Chinese paddlefish!

Presumably, the government is motivated both by the hydropower opportunities (the planned Jinsha stations will have a combined generating capacity of 60 gigawatts, exceeding that of the TGD by almost a factor of three) and the prospect of forestalling the politically inconvenient inundation of Chongqing.

Multiple hydropower projects on the Yangtze's many steep Sichuan tributaries - as opposed to a single megadam across the main river - were proposed by Dai Qing's interlocutors as a viable alternative for exploitation of the river's potential. If the network of upstream dams ends up saving the Three Gorges Dam's bacon, it would be a rather ironic outcome.
On the opposite end of the foresight and planning spectrum, it appears that the TGD operators intend to keep on doing what they do - optimizing power generation - and try to buy their way out of whatever problems might occur.

Liu again:

Despite being well aware of the severity of the problem, the Three Gorges Project Corporation has never mentioned anything about it to the public. However, one employee of the company told me that its former general manager, Lu Youmei, once suggested the corporation could pay the few hundred million yuan to relocate Jiulongpo port to a more navigable location. When I interviewed the deputy general manager, Cao Guangjing, he put forward the same idea.

Summing up, Yin told Asia Times Online:

As to who is right, Dai Qing or the government, I think only time will tell. From the long-term perspective of a geologic time scale, all lakes on earth, artificial or natural, are doomed because of sedimentation.

As to the TGD, there is a designed project lifespan (at least 100 years for major engineering structures like large dams). So the question really is whether sedimentation problem will significantly shorten the design lifespan of the project.

Sooner or later the reservoir will silt in and the Yangtze will meander through a newly created alluvial plain in the Three Gorges, topple over a man-made waterfall at the dam, and sluice profitably through a group of turbines on its way to the middle Yangtze basin.

One fifth of Sichuan will be at risk of floods (Huang Wanli's estimate). Chongqing's port and perhaps even chunks of the city will be relocated, presumably enriching officials and contractors in the process.

It may take less than 100 years for the Chinese public to calculate costs and benefits and form a verdict on the Three Gorges Dam. If things continue as they are - a cycle of persistent sedimentation and additional dam construction, and a spiral of pollution, landslides, relocation, corruption, and local economic stagnation - Sichuanese resentment will mirror the anger Shaanxi feels for the San Men Xia Dam. That will be an expensive problem … and a problem that, in the end, money might not be able to solve.

In 1993, Huang told Dai Qing:

The residents of Sichuan will naturally begin to ask why ... they must make such sacrifices ... You must know of the "Road Protection" movement toward the end of the Qing Dynasty. It was when local interests were compromised in 1911 [by a threat by the central government to seize
locally built railroad operations] that an opportunity for the Republican Revolution to topple the imperial regime occurred. [8]

Nationally, the Three Gorges Dam is in danger of going down in history as an enormous money pit that does little more than unfairly enrich the power company allowed to operate this gigantic and gigantically expensive asset.

As a political matter, the Chinese government had best look to the heavens ... and pray for years of heavy rains that demonstrate the value of the TGD as a flood control mechanism, and wash away resentment of its many, expensive shortcomings.

Notes:

Peter Lee writes on East and South Asian affairs and their intersection with US foreign policy.

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