International Impacts of Damming the Mekong River

Dr. David S. Woodruff, University of California, San Diego

Summary by Dr. David S. Woodruff
Notes by Kathryn Woodruff

The Mekong River rises in Tibet and flows through Yunnan, China, then through five downstream countries: Myanmar, Laos, Thailand, Cambodia and Vietnam. It is among the top dozen most productive large rivers in the world, and its artisanal fisheries, riverside farming, and river-associated trade currently sustain over 73 million people. Freshwater fish diversity is the second highest of any riverine ecosystem in the world. Many if not most of the 1,200 fish species in the Mekong are migratory and leave the mainstream channel to feed and breed in tributaries and on floodplains. This cycle and the ecosystem’s overall high productivity depend on an annual flood-pulse cycle. Humans have also adapted to the river’s natural fluctuations by creating “riparian flood-pulse communities” of great antiquity. In the middle and lower reaches the river rises and falls 10-30 m annually, depending on locale.

A number of hydropower dams have been built on the Mekong tributaries in Thailand, Laos and Vietnam, but the mainstream itself was not dammed until 1993 when the Chinese government completed the 126 m Manwan Dam in Yunnan. Three more mainstream dams have been built or are under construction in Yunnan. The largest of this proposed cascade of 8-12 dams, Xiaowan, will be the world’s second largest dam after Three Gorges, and impound a reservoir 169 km long behind a 300 m high wall. To put the environmental issues posed by these mainstream dams into context, Dr. Woodruff first reviewed the history of the Pak Mun Dam in Thailand. This small 15 m run-of-river dam, completed in the early 1990s with World Bank funds, became the center of both national and international controversy and is now widely viewed as an avoidable ecological, economic and social disaster.

The Report of the World Commission on Dams (2000) singled the Pak Mun Dam out for in-depth review and all involved with development projects in Asia should study the published Case Study. The Thai government proceeded to construct the dam over the muted objections of Thai academics and the stronger protests of local people. The government used a seriously flawed Environmental Assessment (EA)
prepared in 1982 (for a different dam) and ignored their own recommendations for the mitigation of the predicted public health, resettlement, social, economic and environmental impacts. The claims made in the EA for the dam’s benefits were later shown to be demonstrably false and based on inappropriate economic models. Nevertheless, the World Bank Staff Appraisal Report found no problems with the project and strongly supported the borrower’s position. Unfortunately, only the Thai government and the World Bank had access to the EA and any other documentation; Thai and international scientists, and local people and their advisors, could only speculate about the dam, its size and impacts. This changed when the U.S. Agency for International Development (USAID) Affirmative Investigation, a requirement for the use of U.S. funds by the World Bank, discovered the facts and determined that the U.S. would have to oppose the loan. The U.S. position was that the borrower had presented a faulty EA and ignored the World Bank requirement for broad and transparent consultation with all affected parties, the risks of water associated diseases, the impact on the rich fishery, the predicted social costs, and even its own mitigation proposals. In a dramatic series of reversals, the World Bank then backed out of the loan and then, in the first split vote (7:4) of the World Bank Directors, approved the loan a few months later. The dam was built. It transpired that 10,000 families were affected, not 200 as the original EA reported, the fishery collapsed, local family incomes declined from US $40 to US $1 per day, token resettlement efforts failed, the power generated was only 21 MW not the projected 136 MW, and the project’s costs doubled. Today, about 15 years later, the dam gates are left open for months to placate the local people. In retrospect, many avoidable mistakes were made, and in fairness to the Thais, it should be noted that the bitter fight over the dam has produced a stronger and more democratic society, and a more transparent process for the review of both government and private project environmental assessments.

Many of the details surrounding the Pak Mun are unfortunately, of course, typical of dam projects around the world. Three things, however, were unusual and relevant to the following discussion of the probable impact of the much larger Chinese dams.

First, in 1991, biodiversity per se had no standing at the World Bank. The endangerment of a global hot spot in riverine fish and invertebrate diversity was not relevant to the decision matrix used by bank officers. Although the U.S. Endangered Species Act would have effectively blocked construction of a dam like this in the U.S., there were no such constraints or sentiments in Thailand or at the Bank. The fact that the local fishery has dropped from 256 to 12 species is of concern only to local people and a few ichthyologists. Biodiversity conservation and species endangerment as factors in EA preparation are rarely considered in this part of the world and the linkage between biodiversity and ecological services is widely unappreciated.

Second, the nations in this part of the world have yet to develop much sense of their ecological regionalism or inter-relatedness. Both the Thai government and the World Bank ignored the transboundary impacts of the Pak Mun Dam. The Bank, in 1991, did not require borrowers to examine the international environmental impact of their projects. The head of public relations for the Electricity Generating Authority of Thailand put this succinctly when he stated: “It’s best that Thailand use this water
as it is only wasted if it flows to Laos.” The Thai word “pak” in Pak Mun translates as “mouth” and refers to the dam’s location at the mouth of the Mun River, the largest tributary of the Mekong in Thailand. The dam sits a few kilometers from the Mekong and the border with Laos. The dam had an immediate but completely undocumented impact on an international reach of the middle Mekong and the downstream fish communities. Thailand, with the World Bank’s blessing, could ignore such transboundary impacts. In fact, if the Bank had not been the funding agency, even less could have been done to address the problems created by this so-called development project. If the dam had been built without US $54 million in international funds, or by private lenders, its environmental and social impacts could have been far worse.

Third, it should be noted that it was during the period when much regional and international attention was focused on the Pak Mun controversy that the Chinese government constructed its first mainstream dam, the Manwan, in 1993.

The Mekong mainstream dams in Yunnan are funded directly by the Chinese government. The immediate goal of providing cheap hydropower to China’s Southern Power Grid has already been achieved and the fourth dam (Jinghong, scheduled to come on line in 2010) will provide a surplus capacity of 3,000 MW that the Thai EGAT has already contracted to buy. Another four to eight dams (of the 12 originally proposed) will presumably be built in the next decade. The upper Mekong flows through some still lightly populated areas in Yunnan. The dams will displace 75,000 people, mostly minorities. The development of the western Yunnan is a government priority and the Han population of the region has increased from seven percent to 29 percent in the past 20 years. The river provides a gateway to the markets of Southeast Asia and since 2001 the Chinese government has blasted 51 rapids and shoals along 300 km of river south of Jinghong to permit 300-ton boats to reach the Thai border. A Chinese EA was prepared for this extra-territorial channelization project at the insistence of the Asia Development Bank but it is unlikely that Laos or Myanmar could have objected, had they even wanted to.

The nature and quality of the Chinese EA’s for the individual dams are unknown. In the absence of hydrological data, NGO’s and others can only speculate as to the environmental and social impacts of this cascade. Fears have been expressed as to the risks associated with the placement of such large dams and reservoirs in a seismically active area. In particular, it is unknown if lower dams could withstand the catastrophic failure of the largest upstream dam. A second problem involves excessive turbidity, which will clearly reduce the operational life of the dams and their turbines. But the real problem with this cascade of dams does not lie in China, it lies thousands of kilometers away in the downstream communities. The impacts of the altered flow of the Mekong are only just being recognized as an eco-catastrophe in the making.

The Chinese government’s position is that their dams will bring direct benefit to the downstream countries and their riparian communities. Once the reservoirs are filled, they promise to be able to regulate the flow of water into the middle Mekong so as to remove the threat of the annual flood. They propose to even out the river’s flow by reducing the flood flow by 25 percent and increasing low-water discharge rates by 25-70 percent. Cheap hydropower for industrial development and freedom...
from the flood create a “win-win” situation according to the Chinese government. Such benefits are not yet realized in Thailand, where average river levels have fallen 25 percent since 1993 and become abnormally erratic, fluctuating by meters overnight. A long list of problems are now emerging in the middle Mekong including: reduced aquatic productivity, loss of upstream migratory fish habitat and declines in species diversity, declines of fish catches by up to 50 percent. The rapid changes in river levels in the dry season have devastated riverside vegetable cropping and soil fertility declines are being reported. The contamination of the river with toxic chemicals of Chinese origin is feared. It should be noted, however, that much of this is speculative as the Chinese government has not joined the Mekong River Commission and shares hydrological data for the flood season only, and only since 2002, ten years after they began regulating the flow. Nevertheless, it is already clear that the upstream dams are negatively impacting the middle Mekong with its two million ton annual fishery.

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The multiple ecological effects on the middle Mekong are significant but not as serious as the threats to the lower Mekong. In particular, the Great Lake or Tonle Sap of Cambodia may be doomed by the regulation of the Mekong’s flow. The Tonle Sap is the largest freshwater lake in Southeast Asia. It covers 250,000 hectares in the dry season but 1.6 million ha in the flood when lake levels rise from 1-2 to 9-11 meters on average. For most of the year the lake drains slowly through the Tonle Sap River into the Mekong River near Phnom Penh, but when the Mekong floods, the Tonle Sap River reverses direction and refills the lake. Currently, 50 percent of nutrient sediment load and 16 percent of the Mekong’s annual flow enter the Tonle Sap during this reverse-flow flood period. This annual cycle enables large populations of fish and shrimp to feed on the rich flood plains; currently the fishery sustains 1.2 million people and provides 50 percent of Cambodia’s fish and 25 percent of its animal protein. Evening out the flow of the Mekong and preventing the annual flood threatens to destroy the Tonle Sap ecosystem. In turn, this will have further significant negative impacts on the productivity of the downstream Mekong Delta in Vietnam.

Hydrological modeling of this potential eco-catastrophe is severely compromised by the lack of reliable data on Chinese Mekong flow management. Nevertheless, it is thought that within Cambodia, 20 percent of the annual flow and 45 percent of the dry season flow would originate in China. It has now been predicted that the natural reversal of the Tonle Sap River will cease, the lake will quickly fill with sediment, the fishery will collapse, the globally significant migratory bird wetland will disappear, and floodplain agricultural productivity will decline in both wet and dry seasons. Current guesses have the Great Lake ecosystem’s destruction occurring over the next 30 years.
Predictions for the fertile delta region of Vietnam are less precise and one can only speculate as to the impact of the Mekong flood on rice cultivation there when the Great Lake no longer sequesters a significant fraction of the floodwaters and releases them over a period of six months following the flood crest. The Chinese government’s promise of a “win-win” seems fatally flawed.

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This possible eco-catastrophe has been set in motion because of a failure of regional and international environmental governance to recognize the transboundary impacts of development projects. Southeast Asia is replete with examples of large development projects that require a real consideration of international environmental and social effects. In the case under discussion, the large upstream dams and river channelization projects may enhance the Chinese economy, but at the expense of tens of millions of poor and politically marginalized people living far downstream. International law does not yet provide the necessary instruments to encourage or require the assessment and mitigation of transboundary impacts in Southeast Asia. The Aarhus Convention, the Espoo Convention, the UN Convention on the Non-navigational Use of International Watercourses are promising but have yet to be used in this region. Growing regionalism still amounts to the exploitation of poorer nations by their more powerful neighbors. On the face of it, the Chinese dams appear to threaten the basin with irreversible ecological and societal damage. Regional ecological and social sustainability are being traded for short-term national economic development and private profit. To date, there has been a failure of international institutions and civil society to reverse the apparent Chinese government disregard for regional well-being. It is probably not too late to avoid, reduce or mitigate the worse predicted transboundary consequences of the Chinese government’s plans. Clearly, such impacts were largely ignored during the peak of human dam-building activities in the last century. It therefore falls to us in the 21st century to develop ways of ensuring that national self-interests are not advanced at the expense of predictable transboundary environmental and social disasters. Hopefully, an appreciation of the fact that all who live in the Greater Mekong ecosystem are environmentally interdependent will soon become a central axiom for sustainable national and regional planning and development.