Downstream Impacts

of Hydropower and Development of an International River: A Case Study of Lancang-Mekong

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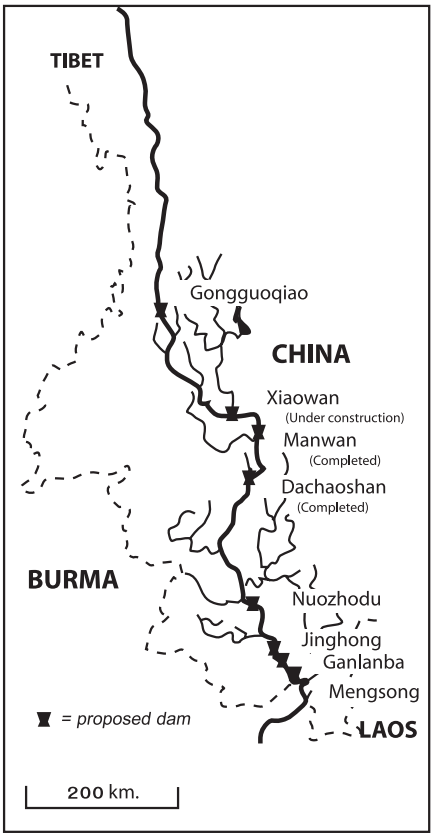
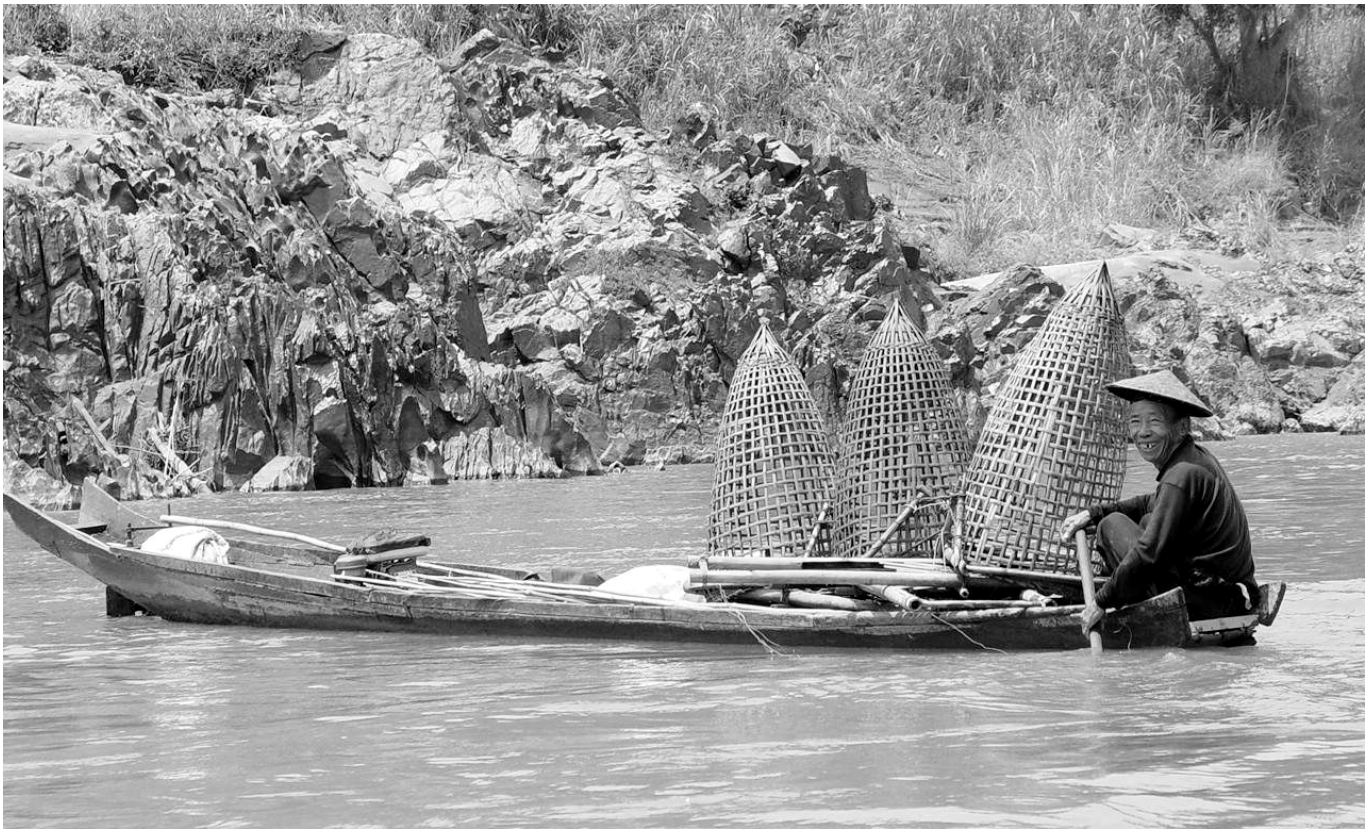
Hydropower and development of the Lancang-Mekong River have caused adverse impact on hydrology of the river, especially for the decreased minimum discharge. After the construction of Manwan dam, the mean minimum discharge of the Mekong River on Thai-Lao border declined by 25 percent. The trend of the minimum discharge is also reduced. The dam operation together with river development project; Upper Mekong Navigation Channel Improvement Project, have caused unusual rapid water fluctuation. These affect the rich riverine ecosystems, fish, and local livelihoods of fishing communities in downstream areas. On Thai-Lao border, it is found that the fish catch has declined for 50 percent as a result of the water fluctuation. Hydropower and river developments have created unprecedented transboundary environmental issues. Thus, it is important for riparian countries to immediately monitor the impacts and consider the recommendations of the World Commission on Dams in decision-making process of the development projects on the Mekong River, on which millions depend.



Map: International Rivers Network



Xiaowan Dam under construction

เขื่อนเซี่ยวหวาน เขื่อนแห่งที่ ๓ บนแม่น้ำโขงกำลังอยู่ระหว่างการก่อสร้าง หากแล้วเสร็จ เขื่อนแห่งนี้จะมีความสูงถึง ๒๙๒ เมตร

Introduction

The Mekong River, the longest river in Southeast Asia, feeding millions in six riparian countries from China to Burma, Laos, Thailand, Cambodia, and Vietnam.

Since 1980s, China has played an important role on Mekong development, under its 'Go West' policy and Lancang Economic Belt. The Lancang Economic Belt policy, comprising of cascade hydropower dam projects on the mainstream of the Mekong River, industrial estates, and Upper Mekong navigation channel improvement project for large cargo ships to navigate from Simao of PRC, to Luang Prabang of Lao PDR.

The Manwan and Dachaoshan dams are already built, Xiaowan and Jinghong dams are under construction. Since China implemented the navigation channel improvement project in the 2001 dry season, along Burmese-Lao border, rapids and reefs have been removed. Along with canalization at Krai rapids, now 300 DWT ships can navigate to the Golden Triangle town of Chiang Saen. However, the plan to blast Khon Pi Luang rapids on Thai-Lao border has been halted due to Thai Cabinet resolution in April 2003. This requests the new Environmental Impacts Assessment and TOR on waterway between Thailand and Laos.

Downstream Impacts

Dam construction and removal of Mekong rapids and shoal mean an unprecedented destruction of the development history of the Mekong River. The impacts of the Upper Mekong development do not exist only at the project sites, but across the boundary far downstream.

Decrease of Minimum Discharge

It is widely publicized that only 18 percent of the total water flow of the Mekong comes from the Lancang. However, in dry season it grows for nearly 45 percent of the average flow as far as Cambodia in April[1] . Thus, water flow form the China's section of the Mekong is extremely important for the flow of the Mekong on Thai-Lao border.

Recently, it is reported that the

[1] International Rivers Network, China's Upper Mekong Dams Endanger Millions Downstream, Briefing Paper 3, October: Berkley, 2002.

Manwan dam has created an impact on minimum discharge of the Mekong, especially in dry season. According to Mr. Weerawut Pornrattanaphan, a hydrologist of Water Resource Department of Thailand, the upper Mekong dams have decreased the minimum discharge of the Mekong at Chiang Saen station for 25 percent. He stated that during 1962-1992, before the Manwan dam construction, the mean of minimum discharge was 752 CMS (Cubic Meter per Second). However, during 1993-2003, the mean of minimum discharge is only 569 CMS[2] . The information also shows that the trend of the minimum discharge is reduced in the long term. This means that the volum of the mekong water is also reduced. (see table 1)

Water Fluctuation

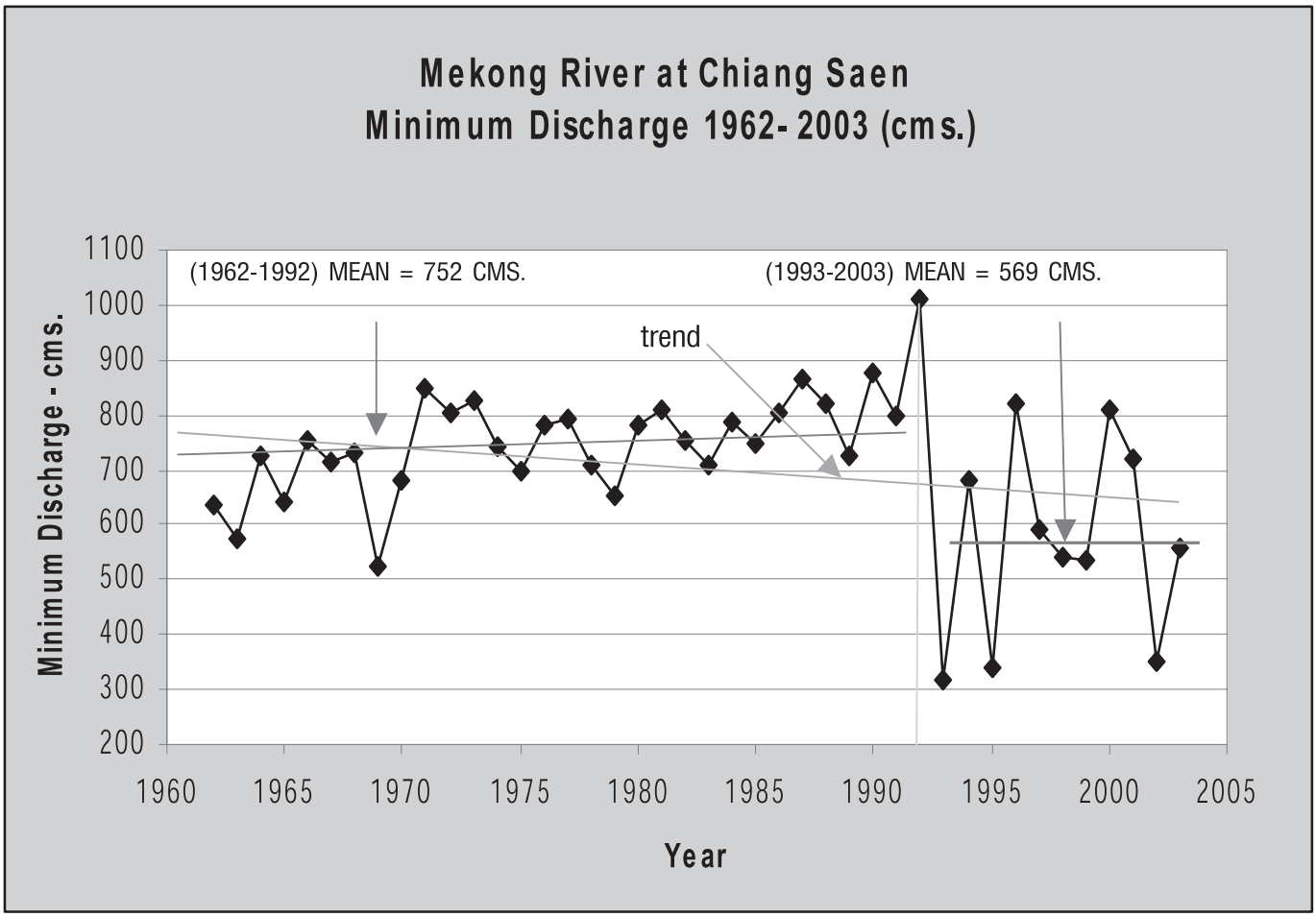
The Mekong rapids blasting which has been implemented since the end of 2001 has created the drastic water fluctuation. In dry season of 2002-2003, the Chinese authorities announced the regulation of the river flow, allowing ships to navigate for one day and then pause for three days to allow for rapids blasting. More recently in dry season 2003-2004, it was announced that the river was to be opened for traffic only five hours in four days[3] .

During January-April 2004, the most unusual and rapid fluctuation in water level was occurred when the Chinese team constructed dyke at Khrai Rapids on Lao-Burmese border, 68 km downstream of Guan Lei port. (see table 2)

It is worried that the water fluctuation in the Mekong would be more fatal, due to three main factors. Firstly, the completion of Jinghong dam which is only about 280 km upstream of Chiang Saen. Secondly, the Chinese authorities' plan to remove sand bar along the Mekong between Jinghong and Guan Lei to allow cargo ships of up to 400 DWT to navigate year-round[4] . Thirdly, the joint agreement among four upper Mekong countries to regulate the river water for dry season navigation.

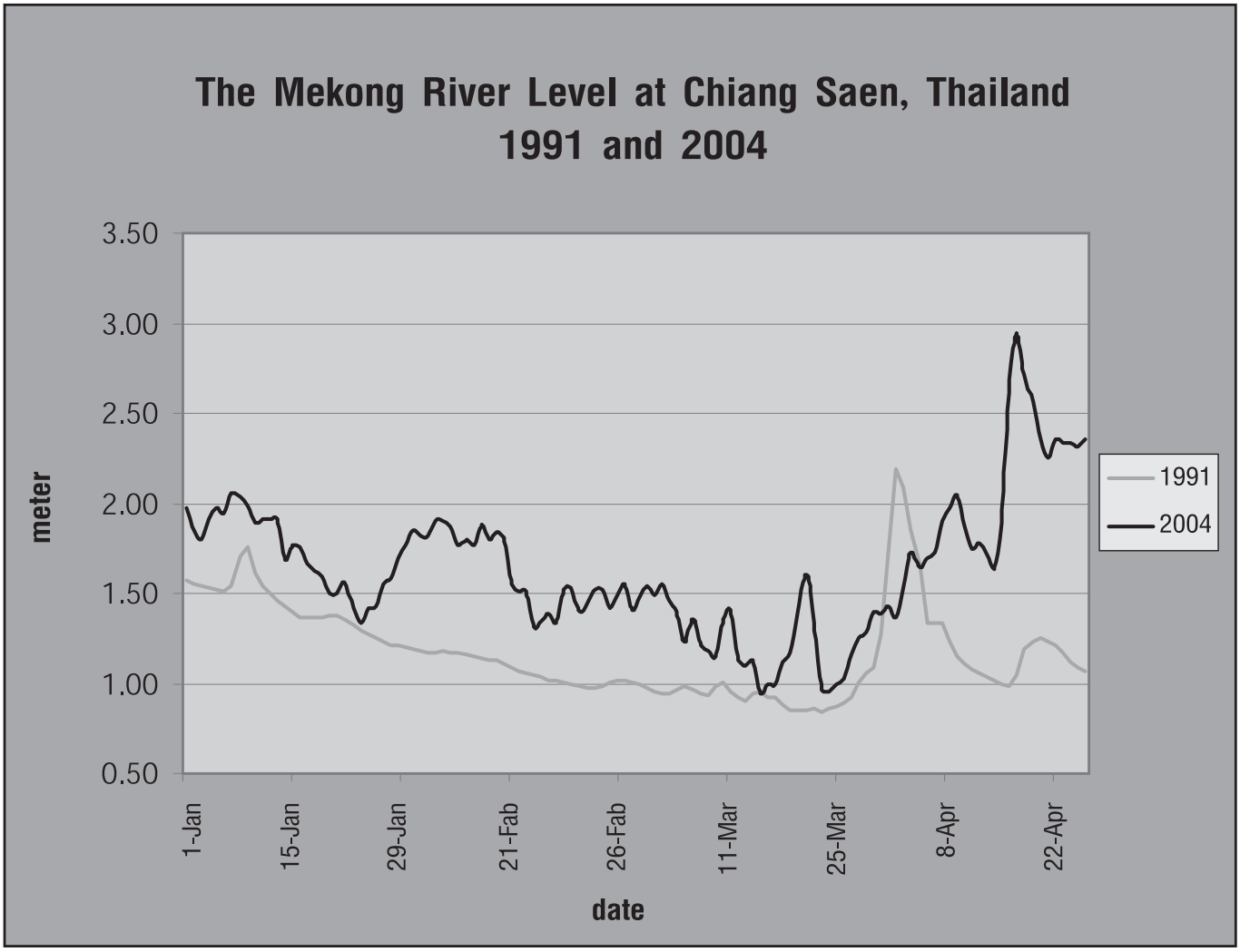
[2] Department of Water Resources, *Report on Water Flow of the Mekong River*, Bangkok, 2004.
[3] Xishuangbanna Maritime Authority, *Instruction from the Navigation Improve ment Timetable*, 2003.
[4] The Nation 13 August 2004

Table 1 Mekong River at Chiang Saen Minimum Discharge 1962-2003



Source: Department of Water Resources (2004).

Table 2 The Mekong River Level at Chiang Saen, Thailand 1991 and 2004



Source: Raw data from Department of Water Resources

Social and Environmental Impacts

The deterioration of the ecosystem means a decrease in food security for local people, as well as disrupted economic and social structures, which are tightly linked to a healthy ecosystem. According to in-dept research of Southeast Asia Rivers Network, fishers along the Mekong on Thai-Lao border in Chiang Rai province complained they could not fish in conditions where the river rose and then lowered swiftly in a day or two as in the past few dry seasons. As most of fish in the upper Mekong are migratory species migrating upstream for reproduction, fish depend on the annual river flow. Thus, the water fluctuation inevitably results in a great decline of fish.

Thai Baan Research, a villagers' research on local knowledge conducted by fishing communities along the Mekong in Chiang Rai province, found that during the past three years, fish catch has been reduced for 50 percent.

Far downstream in northeastern part of Thailand, fishers in Nakorn Phanom province on the Mekong river also insisted that the unusual water fluctuation was witnessed. The fluctuations harmed their fishing occupation. They said fish did not move out of its habitat when the water level is rapidly altered.

Moreover, the water fluctuation also affects the water level in the Mekong's tributaries and wetland areas in the Northeast Thailand. Mr.Rattaphon Pitaksombat of IUCN's Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme revealed that the Songkarm River, the Mekong's tributary was also affected. According to Mr.Rattaphon, the water fluctuation also occurred on the Songkarm River as far as more than 50 kilometer from the mouth of the river.

Impacts on Lower Mekong Countries

Downstream impacts of the Upper Mekong development has also raised concern in the lower Mekong countries. As the Prime Minister Hun Sen warned that Cambodia's Tonle Sap lake, a vital source of fish of the coun-

try, could dry up if development projects are not handled carefully on the Mekong River upstream from the lake[5] .

[5] AP/ENN, February 12, 2003

Recommendations

All riparian government should immediately stop all works on the hydropower and river development on the Lancang-Mekong, and properly conduct comprehensive environmental and social impact assesments according to international standards. These assesments should be carried out in a transparent and participatory manner, with recognizing the health and vitality of the Mekong River and the lives of those who depend on it.

The World Commission on Dams' strategic priorities such as Gaining Public Acceptance, Comprehensive Options Assesment, Sustaining Rivers and Livelihoods, and Sharing Rivers for Peace, Development and Security, should be considered.

References

[1] Department of Water Resources, *Report on Water Flow of the Mekong River*, Bangkok,2004.
[2] International Rivers Network, *China's Upper Mekong Dams Endanger Millions Downstream*, Briefing Paper 3, October: Berkley, 2002.
[3] World Commission on Dams, *Dams and Development: A New Framework for Decision-Making*, London: Earth Scan, 2002.
[4] Xishuangbanna Maritime Authority, *Instruction from the Navigation Improvement Timetable*, 2003.
[5] AP/ENN, February 12, 2003
[6] The Nation, 13 August 2004

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Kai, Mekong seaweed, a source of income for women during dry season, has decreased drastically due to the unusual water fluctuation.

การขึ้น-ลงของน้ำโขงที่ผิดธรรมชาติ ส่งผลกระทบต่อระบบนิเวศน์แม่น้ำ ในภาพจะเห็นว่าไก หรือสาหร่ายแม่น้ำโขงซึ่งเป็นอาหารของปลา และชาวบ้านริมฝั่งน้ำเขตพรมแดนไทย-ลาวทางตอนบน แห้งตายเนื่องจากระดับน้ำลดลงอย่างรวดเร็ว ซึ่งไม่เคยปรากฏมาก่อน