

Executive Summary of Environmental Impact Assessment
on the Navigation Channel Improvement project of the
Lancang - Mekong River from China-Myanmar Boundary
Marker 243 to Ban Houei Sai of Laos

1 Introduction Prepared by the joint experts group for EIA of
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1.1 The Lancang-Mekong River is the sole in Asia, which links six countries of the sub-region, namely, China, Laos, Myanmar, Thailand, Cambodia and Vietnam. Since a long time ago, the River, which was reputed as *the Eastern Danube*, has been a natural link, nationalities' passageway and economic corridor that link closely the communities, economies and cultures of Southwest China and Southeast Asia. Originating from the Tanggula Mountain in Qinghai Province of China, the River totals 4,880 km in length, with 2,130 km of inland waterway in China, 31 km of China-Myanmar boundary waterway, 234 km of Lao-Myanmar boundary waterway, 976 km of Lao-Thailand boundary waterway, 777 km of inland waterway in Laos, 502 km of inland waterway in Cambodia and 230 km of inland waterway in Vietnam. Total drop of the entire river falls 5,060 meters with average gradient of 0.104%. Its average discharge at the sea entrance reaches 12,000 cubic meters per second and the River basin covers 810,000 square kilometers. Among all developments of the abundant resources in the basin such as waterway transportation, irrigation, hydropower generation, minerals, tourism, forestry and fishery, the waterway transportation development costs the least investment and gains the most prompt benefits to all the riparian countries. Meanwhile it also promotes exploitation and utilization of other resources. Therefore, the Governments of China, Laos, Myanmar and Thailand took the waterway transportation development as an initiating project of resources exploitation in the basin and organized a joint investigation of waterway transportation on the Lancang-Mekong River in February 1993. The Joint Survey Team unanimously agree that the high priority should be given to the international cooperation in the shipping development of the Lancang-Mekong River, and recommended that a Quadripartite Agreement on Commercial Navigation on the Lancang-Mekong River should be concluded and the project for regulating rapids, shoals and reefs in some sections of the River hindering navigation should be carried out as soon as possible.

1.2 In order to provide a legal guarantee for commercial navigation on the Lancang-Mekong River among China, Laos, Myanmar and Thailand, the Transportation Ministers of the four countries officially signed Agreement on Commercial Navigation on the Lancang-Mekong River among the Governments of the People's Republic of China, the Lao People's Democratic Republic, the Union of Myanmar and the Kingdom of Thailand (hereinafter referred to as the Quadripartite Agreement) in Tachileik, Myanmar on 20 April 2000 after 6 meetings held at Working Level in 7 years starting from 1994. Article 2 of the Quadripartite Agreement stipulates that, one year after its signature, the vessels of any Contracting Party are entitled to sail freely between Port of Simao in China and Port of Luang Prabang in

Laos according to the Quadripartite Agreement and the relevant common rules and regulations adopted by the Contracting Parties.

- 1.3 In order to effectively implement the Quadripartite Agreement, the Technical Working Group on the Implementation of the Quadripartite Agreement was set up right after the signing of the Agreement. The Technical Working Group, with the Chinese side being coordinator, held three meetings in Jinghong, Kunming and Beijing in May 2000, September 2000 and March 2001 respectively, having considered and adopted the six technical rules and regulations prepared by the Chinese side. The Senior Officials Meeting, which was held in Beijing on 14-15 March 2001, considered and endorsed the six rules and regulations as appendixes to the Memorandum of Understanding (MOU) signed by the senior officials from the four countries.
- 1.4 The throughput of the international shipping on the Lancang-Mekong River will increase rapidly, thanks to a further recovery of economies of the ASEAN countries, the official opening to commercial navigation on the Lancang-Mekong River and the demands for developing economy, trade and tourism in the areas along the River in particular. It is predicted that the throughput of cargoes and the number of passengers to be transported on the River would reach 1.5 million tons and 0.4 millions by 2010 respectively. Whether or not the international shipping on the Lancang-Mekong River can make benefits and promote a further cooperation in the field of economy, technology and trade as well as friendly exchanges among the countries along the River, besides strictly implementing the Quadripartite Agreement and the relevant rules and regulations, all depends on whether the navigability of the waterway can be improved, the tonnage of vessels increased, safe navigation all the year round ensured and the transportation cost reduced.

At present, however, the waterway of the 331 km from China-Myanmar Boundary Marker 243 to Ban Houei Sai of Laos is the natural waterway with the worst navigability among the waterway of the 886.1 km between Simao of China and Luang Prabang of Laos. There are more than 100 shoals, rapids and reefs in that section of the waterway, of which 11 major rapids and 10 scattered reefs seriously threaten the vessels' safe navigation. During the trial navigation periods, such accidents as striking reefs and grounding often happened to the vessels, causing the threatening to and losses of crewmembers' lives and properties. Furthermore, the vessels can only navigate with the load reduced for more than half a year during each year, due to the shoals, rapids and reefs hindering navigation.

In view of the above-mentioned facts, the Second Meeting of the Technical Working Group on the Implementation of the Quadripartite Agreement held in Kunming, China on 18-22 September 2000 considered and adopted 6 Draft Documents,

including Draft Guidelines on the Maintenance and Improvement of Navigability of the Lancang-Mekong River, unanimously held that all necessary measures should be taken to regulate the major shoals, rapids and reefs seriously hindering navigation for the purpose of ensuring the vessels' safe navigation and agreed that a Joint Survey Group consisting of waterway, environmental protection and boundary experts from the four countries should be established to conduct a joint survey on the feasibility of the waterway improvement project on the above-mentioned section of the River. The Joint Survey Group carried out a joint survey for that purpose in November 2000, with following conclusions, inter alia: a) the navigation channel improvement project is technically feasible; b) the project would not change the thalweg and flow discharge of the River as well as the boundaries along the River, and put forward the recommendations for regulating the waterway; and c) it is imperative and imminent to carry out the project.

- 1.5 In accordance with the decisions made at the Third Meeting of the Technical Working Group on the Implementation of the Quadripartite Agreement and the Senior Officials Meeting concurrently held in Beijing on 12-15 March 2001, the joint EIA Team and Detailed Survey Team, with the Chinese side being coordinator, were established and went to the working sites along the River on April 18 and April 29, 2001 respectively for the purpose of detailed survey and hydrological data collection. The two Teams had completed the site survey, data collection and relevant work by 12 June 2001 and the EIA Team has also considered and adopted the Outline for Preparing EIA Report. From September 17 to 28, 2001, the members of the EIA Team and Design Team met in Wuhan, China. In line with the relevant international conventions, declarations, technical rules and regulations, the Teams finalized the EIA Report and Conceptual Design for the navigation channel improvement project on the basis of the draft text prepared by the Chinese Side.
- 1.6 The Official Inauguration Ceremony for Commercial Navigation on the Lancang-Mekong River among China, Laos, Myanmar and Thailand was held on 26 June 2001. It is convinced that the official opening of the commercial navigation on the River and the navigation channel improvement thereof in particular will promote the development of transportation, tourism, energy, economy and trade as well as human resources development in the sub-region. It will play a positive role in promoting the economic development and social progress in the sub-region, thus greatly benefiting the peoples along the River.

Assessment Objectives

The Lancang-Mekong River from China-Myanmar Boundary Marker 243 to Ban Houei Sai of Laos is an unregulated and undeveloped natural navigation channel.

Shipping on this natural navigation channel may result in safety accidents at any time. According to the incomplete statistics, since the Upper-Mekong River was navigable, there have occurred about 50 accidents, which have caused severe threatening to and losses of the lives and properties of crew members of China, Laos, Myanmar and Thailand. Among the 10 recorded severe accidents with vessels sunk and cargoes lost, except one caused by fire, 9 were caused by striking reefs. 70% of the reef striking happened at the shoals or rapids to be regulated by this Project.

The purposes of the Project are to improve the navigational conditions, to safeguard the safe navigation of vessels, to reduce the losses of properties and levies and to mitigate pollution by fuel oil leakage due to the accident. The main works of the Project are to regulate 11 rapids or shoals and 10 scattered reefs that seriously hinder navigation of vessels. The implementation of the Project and the vessels' operation thereafter will result in positive and negative impacts on the environment along the River. Based on the investigation of the environment situation of the Project area, this Report forecasts the impacts on the environment through the analysis of the project impacts and put forward the feasible measures of pollution prevention and ecological impact retardation. This Report also provides basis for the governments of the four countries in respect of the decision-making of the Project and guide the environment protection design and the environment management during the period of both construction and operation, thus mitigating the negative impacts of the Project on the environment and increasing positive impacts thereof. As a result, the countries along the Lancang-Mekong River can make better economic and social benefits through the implementation of the Project.

Scope of Work

Assessment Targets refer to the following items relating to the water and land areas within 331 km of waterway from China-Myanmar Boundary Marker 243 to Ban Houei Sai of Laos:

- 10 dangerous rapids and one shoal, i.e. Huai La rapid, Lower Tang Luang rapid, Khrai rapid, Long Zhom rapid, Nam Loi river mouth rapid, Khong Tan rapid, Tang Salum rapid, Wong Wit rapid, Sam Zhao rapid, Kon Pi Luang rapid and Wan Seng shoal;
- 10 scattered reefs, at rapids of Chuang Nam Tang Lan, Tha Ban Bo, Kon Mu Tai, Ton Pa Nok Yang, Huai Na Yo, Tang Pang, Saen Pi, Lower Mong Pa Liao, Nam Lor river mouth and Tang Ao.
- 6 winching facilities;

- 100 navigation marks and 106 navigation signboards.

The scope of assessment is as follows:

- Air quality, noise and ecological environment;
- Analysis of hydrologic impact on discharge, flow velocity, water level, waterfront and thalweg after navigation channel improvement;
- Analysis of impacts on aquatic lives, especially fishes, during construction;
- Analysis of social impacts.

4 Environmental Impact Mitigating Measures and Monitoring

4.1 Environmental Impact Mitigating Measures during Construction

The construction schemes for reef blasting and blasted rock removal need to consider the protection of ecological environment of the concerned water areas, and benefit water and soil conservation.

(1) Only at the Tang Salum Rapid it is hard for boring ships to fix and position due to large waves and rapid flows, bare blasting method will be applied for underwater reef blasting. The underwater reef blasting of other rapids/shoals will employ borehole-blasting method in order to form good blasted layers and to reduce sizes of blasted rock blocks for the sake of easy removal of excavated materials, dumping and transportation. Such measures will also reduce the possibility of harm of blasting shock waves and flying blocks on aquatic lives, especially fishes. Before formal reef explosion, small equivalent weight blasting is applied to pre-alarm the fishes in the construction area to move away so as to reduce possible harm on the fishes within the scope of construction sites.

(2) Selection of rock-blasting time: rock blasting and excavation should avoid the two migration periods of fishes every year. There are two migration peaks of fishes in the river: upbound from mid-April to July, when the water level is lowering; downbound from September to December, when fishes return to the main waterway from branch rivers, i.e. spawning/feeding ground. Rock-blasting shall be arranged in the dry season (end of December to March of next year) so that the returning and spawning period of fishes in the main river shall be avoided to lessen the possible impacts on growth and reproduction of fishes.

- (3) The excavated materials will be barged to the dumping areas or to the banks for revetment.
- (4) Blasted rocks to be dumped underwater during the construction shall be filled in the troughs downstream the regulated areas. The dumping places shall avoid the habitats of aquatic lives and spawning areas of fishes.
- (5) The construction of this Project will cause short-term impacts on the navigation of passing ships. The time of construction shall be reasonably arranged on the basis of the overall project schedule to avoid endangering the safety of passing ships and to reduce waiting time of ships.
- (6) Temporary warning marks shall be set up at upstream and downstream of the rapids/ shoals to be regulated and the operation sites of construction vessels to ensure the navigation safe of passing ships. Necessary means shall be used to inform the nearby residents and possible passing ships prior to blasting in order to avoid accidents.
- (7) When the Project is undertaken in the countries concerned, relevant authorities and people should be informed of the details of the purposes and time schedule of the construction and possible impacts on environment, so as to reduce unnecessary disputes with the concerned countries.

4.2 Measures for Protection of Water Quality

- (1) According to the Technical Regulations on Surveys of Commercial Ships on the Lancang-Mekong River, commercial ships shall be equipped with oily water separators or tanks for oily wastewater to avoid pollution of the water area for navigation from bilge water containing oil.
- (2) Small ships without oily water separators shall have temporary reception tanks.
- (3) Reception and treatment facilities for bilge shall be set up at large ports and terminals to receive and treat.

4.3 Measures for Solid Waste Management

- (1) The daily garbage from contractors on banks and on board the construction ships shall be collected for appropriate disposal.

(2) All the garbage on board shall be collected with dustbins or bags, and shall not be thrown into the river. After arrival at the destination ports, the garbage shall be received and treated by the port treatment stations.

4.4 Measures for Air Quality Protection and Noise Control

The blasting and proper equivalent weight blasting shall be applied on land so as to reduce the affected scope of dust and noise of blasting.

4.5 Monitoring

Because this Project involves four countries, the environment monitoring work shall be in principle undertaken by local qualified environment monitoring organizations of the countries concerned. Nevertheless according to the actual situations, an overall environment monitoring organization may be assigned to undertake the environment monitoring work through consultations among the related authorities of China, Laos, Myanmar and Thailand. The key item of monitoring is water quality which shall be monitored with periodical spot test method according to the requirements of environment monitoring.

5 Conclusions and Recommendations

5.1 Survey of Current Environment

Water quality in the 331km section is good and in line with the requirements of environment quality standard. The air quality of the Lancang-Mekong River Subregion is good. The noise is in line with the assessment standard, and the noise quality at the investigated construction sites is good.

5.2 Impacts on Aquatic Lives (Fishes) during Construction

(1) Negative impacts

The preparation work prior to reef blasting, which will scare away the fishes in the construction sites, will be positive to mitigation of negative impacts on the fishes by reef blasting within the scope of construction sites. The main underwater construction will be so scheduled to avoid the periods of fish migration and reproduction so that the impact on fishes will be mitigated.

The possible impact scope of reef blasting is 114m. In case the 11 rapids/shoals and 10

scattered reefs are blasted simultaneously, the scope of impacts on fishes by shock waves will not exceed 0.8% of the 331km section, or 0.1% of the riverbed area, so the scope of impacts is rather small, and the impacts of shock waves will not exist upon the completion of reef blasting. Macroscopically speaking, this Project will not cause significant change to the ecological system of the 331km reach and the lower stretch therefrom, and it will have minor negative impacts on the long-term behaviors of the fishes in the Lancang-Mekong River.

(2) Positive impact

After regulation of the rapids, the current velocity will be reduced, which will be favorable for upbound migration of fishes.

5.3 Impacts on Hydrology

- (1) The affected scopes of the rapids/shoals regulation are less than 1 km in dry season except for the Tang Salum, Kon Pi Luang and Wan Seng, which are 1.37 to 2.3 km. The affected variation of water level is within 0.3 m for all the rapids/shoals, except for Tang Salum Rapid where the level changes between 0.80m. In flood and mean water seasons, water levels in the project area will alter much less than the above. The regulation of those rapids/shoals will have minor impacts on the hydrograph of water level of the 331km section and its lower part.
- (2) There is a change in current velocity in the project sites, including more smooth flow pattern and obvious improvement in flow field distribution than that in natural state. The change of flow velocity at the project sites is local and small. The largest alteration occurs in Long Zhom Rapid at a range of -1.166-0.462m/s, and the least in Wan Seng Shoal at 0.000-0.011m/s. There will be no alteration of the flow field distribution in the 331km section and its lower part.
- (3) The regulation of rapids/shoals does not influence the precipitation within the basin, and neither reduce nor increase the runoff in the River and its tributaries, and neither store nor discharge any flow. Navigation channel regulation neither create any interference with water- flow distribution in the River and its branches nor create influences. Therefore, this Project will not alter the flow discharge in the 331 km reach and its lower part.
- (4) Riverbed in the project sites is composed of rock (except for the Wan Seng Shoal

with pebble bed), resistible to scouring of flow. The regulation of rapids/shoals will not cause bank collapse due to new erosion, thus not changing the shore profile and the existing territory or boundary line.

(5) Partial change in velocity distribution at rapids/shoals will not alter the overall geometry shape of the riverbed cross-section; in other words, there is no change to thalweg in the project sites.

(6) The flood peak might pass through Houei Sai of Laos 58 seconds earlier than that before the implementation of the Project. This impact will gradually disappear downstream from Ban Houei Sai with influence of natural factors. The implementation of the Project will not result in impacts on flood discharge in both project area and its lower part.

5.4 Analysis of Accident Probability

The accident probability will be reduced by about 70% by regulation of shoals/rapids and reefs, and about 20% by installation of navigational aids. Accordingly the accident probability will be reduced by about 90% compared to present situation on the completion of the navigational channel improvement compared to the present situation

5.5 Social Impacts Assessment

(1) Negative Impacts

- Blasting shall have minor and short-term negative impacts on navigation of vessels, and will have minor negative impacts on local residents. After the completion of the project, ever such impacts will not exist any more.
- Smooth navigation may result in some minor impacts on public health

(2) Positive Impacts

The implementation of the Project will:

- Be beneficial to the sustainable development of the economy of the Lancang-Mekong River basin;
- Be positive to the safe navigation of ships so as to reduce the threats of accidents

on the people's lives and properties as well as the environment;

- Strengthen economic cooperation and cultural exchange;
- Promote the economic development of the whole basin;
- Stimulate the rapid development of the tourism, trade and technical and economic cooperation among the four countries with other Southeast Asia countries; and
- Provide more employment opportunities for the local people to improve their living standard and to raise their living quality.

5.6 Final Conclusions

This Project is acceptable according to environmental protection laws of China, Laos, Myanmar and Thailand. With the measures of engineering and environmental protection taken, the Project will improve navigational conditions, which will be positive to the safe navigation of vessels, reduction of the losses of properties and lives of the passengers and crewmembers, mitigation of the pollution caused by ship accidents and promotion of the sustainable development of the Greater Mekong Subregion. During the period of construction, the Project will have minor possible impacts on the local ecological environment within 100~200m of the rapids/shoal to be regulated and will have minor impacts on ecological system within the Project section of the River and will cause minor possible impacts on villages, towns, scenic spots, wildlife and plants along the River. The construction of the Project will not change the discharge, waterfront and thalweg of the River. The high flood will pass through Ban Houei Sai of Laos 58 seconds earlier than that before the channel regulation. This impact will gradually disappear downstream from Ban Houei Sai with influence of natural factors. The implementation of the Project will not result in impacts on flooding season within the Project section of the River. Therefore the Lancang-Mekong River Channel Improvement Project is feasible in environmental point of view.

5.7 Recommendations

- (1) Taking into consideration the importance and imminence of the Project, the EIA Report should be considered and approved by the competent authorities of the four countries as soon as possible.

(2) During the construction period, the local authorities concerned should provide necessary facilitation and assistance in respect of the implementation of the Project.

(3) If any unexpected or cumulative impacts occur during the construction or operation period, the competent authorities of the four countries shall report to JCCCN for consideration. The relevant mitigation and monitoring programs for such impacts shall be made and implemented.

(4) Observation and research programs on rapids and shoals, after implementing the channel improvement works, should be arranged.