



# Technical Assistance Report

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Project Number: 40514  
February 2007

## Lao People's Democratic Republic: Preparing the Cumulative Impact Assessment for the Nam Ngum 3 Hydropower Project (Financed by the Japan Special Fund)

Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 1 February 2007)

Currency Unit	–	kip (KN)
KN1.00	=	\$0.000105
\$1.00	=	KN9,649.5

## ABBREVIATIONS

ADB	–	Asian Development Bank
AFD	–	Agence Française de Développement
CIA	–	cumulative impact assessment
EA	–	executing agency
FSL	–	full supply level
GIS	–	geographic information system
GMS	–	Greater Mekong Subregion
IWG	–	interministerial group
IWRM	–	integrated water resource management
Lao PDR	–	Lao People's Democratic Republic
NN1	–	Nam Ngum 1
NN2	–	Nam Ngum 2
NN3	–	Nam Ngum 3
NN4	–	Nam Ngum 4A
NN5	–	Nam Ngum 5
NNR	–	Nam Ngum river
NNRB	–	Nam Ngum River Basin
NNRBSDP	–	Nam Ngum River Basin Development Project
PIA	–	poverty impact assessment
TA	–	technical assistance
WRCC	–	Water Resources Coordination Committee

## WEIGHTS AND MEASURES

GWh	–	gigawatt-hour (1,000,000 kWh)
kWh	–	kilowatt-hour (1,000 Wh)
MW	–	megawatt (1,000,000 W)
TWh	–	terawatt-hour (1,000,000,000 kWh)

## TECHNICAL ASSISTANCE CLASSIFICATION

<b>Targeting Classification</b>	–	Targeted intervention – geographic intervention
<b>Sector</b>	–	Energy
<b>Subsector</b>	–	Hydropower generation
<b>Themes</b>	–	Inclusive social development, environmental sustainability, capacity development
<b>Subthemes</b>	–	Involuntary resettlement, cleaner production, Institutional development

## NOTE

In this report, "\$" refers to US dollars.

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LAO PEOPLE'S DEMOCRATIC REPUBLIC  
**PREPARING THE CUMULATIVE IMPACT  
 ASSESSMENT FOR THE NAM NGUM 3  
 HYDROPOWER PROJECT**



## I. INTRODUCTION

1. The Nam Ngum River (NNR) in the Lao People's Democratic Republic (Lao PDR) is one of the major tributaries of the Mekong. Several hydropower projects, including the Nam Ngum 3 Hydropower Project (NN3), are either planned or under construction on the NNR. These projects have been accorded the highest priority for development by the Government of the Lao PDR and are expected to start commercial operations within the next 5–6 years. The Project Contact Consultation Mission fielded by the Asian Development Bank (ADB) in February 2006 concluded that a cumulative impact assessment (CIA) study was necessary because of the simultaneous development of several hydropower projects in the basin. The Fact-Finding Mission fielded in June 2006 reconfirmed these findings, and met with the Government to discuss the possibility of providing project preparatory technical assistance (TA) to undertake a CIA study. ADB Management provided concept clearance for the proposed TA in June 2006. During the TA Preparation Mission fielded in September, following the formal funding request by the Government,<sup>1</sup> the Mission held discussions with ministries and stakeholders on the proposed TA and reached an understanding with the Government on the objectives, cost estimates, implementation arrangements, and terms of reference for the TA as phase 1 of loan processing. The design and monitoring framework is in Appendix 1.<sup>2</sup> The due diligence review of the project, which includes the review of project-specific environmental and social impacts will be done separately as phase 2 of loan processing.

## II. ISSUES

2. The hydropower potential in the Greater Mekong Subregion<sup>3</sup> (GMS) is extensive, estimated at 30,000 megawatts (MW), but is unevenly distributed among the GMS countries. The Lao PDR has the largest hydropower potential at 18,000 MW, but the smallest domestic power requirements. Under a program of cooperation,<sup>4</sup> the GMS member countries have agreed to promote the development and trading of energy to enable member countries to have access to more economically viable energy resources. Since the Lao PDR is centrally located, it is well-positioned to harness its hydropower potential for export to GMS countries that have limited remaining hydropower resource and where demand for power is growing rapidly. The Lao PDR currently has commitments under bilateral power trading agreements to export up to 5,000 MW to Thailand<sup>5</sup> and up to 3,000 MW to Viet Nam.

3. Hydropower is the major source of electricity for the country and a vital source of export earnings.<sup>6</sup> The Government has adopted a two-pronged power sector development strategy that aims to (i) increase access to electricity for the country's largely rural population, and (ii) earn foreign exchange from the export of electricity. Thirty-three hydropower projects that are expected to be completed by 2020 would increase the installed capacity by 8,935 MW.<sup>7</sup>

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<sup>1</sup> In a letter dated 21 August 2006, the Minister of Finance requested assistance to fund the country's equity in the project while the sponsor signed a mandate with ADB on 6 March 2006 to obtain financial assistance for NN3.

<sup>2</sup> The TA first appeared in *ADB Business Opportunities* on 19 September 2006.

<sup>3</sup> The GMS countries are Cambodia, People's Republic of China, Lao PDR, Myanmar, Thailand, and Viet Nam.

<sup>4</sup> In 1992, the GMS countries entered into a program of cooperation designed to enhance economic relations and promote development in the region. The program presently covers nine sectors: agriculture, energy, environment, human resource development, investment, telecommunication, tourism, trade, and transport.

<sup>5</sup> Thailand estimates that an additional 20 gigawatts (GW) of electricity is needed to support its growing economy. The power sector strategy of Thailand, among others, calls for the diversification of its electricity supply sources and reduced reliance on imported gas for fuel.

<sup>6</sup> Export of hydropower began in 1971 with the commissioning of Nam Ngum 1. By 2004, the export of hydropower accounted for 30% of the total export receipts of the country.

<sup>7</sup> Source: Ministry of Energy and Mines, Department of Energy.

4. The Government has proposed that the NNR be used extensively for hydropower generation. Nam Ngum 1 (NN1) with an installed capacity of 150 MW, is already in operation while Nam Ngum 2<sup>8</sup> (NN2) with an installed capacity of 615 MW, is under construction. Other projects under development include (i) NN3<sup>9</sup> with an installed capacity of 440 MW, (ii) Nam Ngum 5<sup>10</sup> (NN5) with an installed capacity of about 100 MW–120 MW, and (iii) Nam Ngum 4A<sup>11</sup> (NN4) with an installed capacity of 60 MW. There are also other existing and planned projects in tributaries to the NNR downstream of NN1, of which several are river basin transfers.<sup>12</sup> A commercial mining operation<sup>13</sup> is also located in the NNR basin (NNRB) upstream of NN2.

5. NN3 is one of the priority projects considered by the Government in relation to its hydropower export to Thailand.<sup>14</sup> NN3 will be built 4.5 kilometers (km) upstream of the confluence of the Nam Pha river, approximately 55 km upstream of the NN1 reservoir and 16 km upstream of the NN2 reservoir. A 220-meter (m)-high, rolled compacted concrete dam with a gated spillway will be built to create a 25.6 square kilometer (km<sup>2</sup>) reservoir, which will inundate a 63 km section of NNR. NN3 will generate an average of 2,191 gigawatt hours (GWh) annually. Construction is slated in 2008 and commissioning expected by 2013.

6. The Government has adopted a policy that requires that, for each hydropower project, environment and social impacts, including cumulative impacts, be identified and mitigated.<sup>15</sup> Potential adverse impacts to the environment typically include degradation of biodiversity, fishery and aquatic habitats, and water quality. Potential social impacts would normally include (i) involuntary resettlement; (ii) impact on indigenous peoples; (iii) disruption of lifestyle and traditions; (iv) loss of income; (v) trafficking of women and children; and (vi) possible emergence of infections and illnesses, including those that are transmitted sexually (e.g., HIV/AIDS).

7. The NN1 reservoir supports a thriving fishing industry that currently yields about 1,500 tons of fish per year, equivalent to \$3.0 million annually. The fishing industry provides subsistence livelihood to the villages around the NN1 reservoir and immediately upstream. The short-term sustainability of this industry is uncertain with the construction of both NN2 and NN3. The combined impacts of poor water quality discharges from NN2 and NN3 may lead to a substantial reduction of fish catches at the NN1 reservoir that would impact commercial fishing in the NN1 reservoir. NN2 impoundment could require the resettlement of about 6,000 people from 16 villages, while NN3 will impact about 71 households consisting of approximately 500 individuals from Ban Xiengdet village at the upstream end of its reservoir. These impacts and

<sup>8</sup> NN2 will be developed by a consortium led by SouthEast Asia Energy Limited. Other major shareholders include Ratchaburi Electricity Generating Public Company (Ratchaburi), Bangkok Expressway Public Company and the Government of the Lao PDR. NN2 is expected to be commissioned by 2011.

<sup>9</sup> NN3 is being developed by a consortium consisting of GMS Power Public Company Limited, Marubeni Corporation, and Ratchaburi. The Government of the Lao PDR will have a 23% equity stake in NN3.

<sup>10</sup> This project will be developed by Sino-Hydro Corporation of the People's Republic of China (PRC). Construction on NN5 will begin in 2007 with commercial operations expected by 2009–2010.

<sup>11</sup> A sponsor has yet to be awarded the right to develop this project.

<sup>12</sup> Existing: Nam Song River Diversion (same-basin transfer from Nam Song to NN1), Nam Leuk hydropower plant (basin transfer from Nam Leuk River basin to NN1), Nam Mang 3 hydropower plant (basin transfer from Nam Ngong to lower NNR); planned: Nam Lik ½ on Nam Lik, tributary to lower NNR.

<sup>13</sup> Phu Bia Mine is a commercial open pit mining operation owned by Pan Australian Resources. Mining operations began in 2005 while construction for an expansion of copper-gold operations started in 2006.

<sup>14</sup> NN2 and NN3 have export earnings potential as their size is suitable to meet the Thai market requirements. NN4A and NN5 would be more appropriate for the domestic market, given their sizes.

<sup>15</sup> Science Technology and Environment Agency. 2005. *The National Policy on Environmental and Social Sustainability of the Hydropower Sector in Lao PDR*. Vientiane (7 June 2005).

other cumulative impacts have to be identified, and mitigated or avoided to ensure the sustainability of the planned hydropower projects along the NNR.

8. The Government has started to adopt an integrated approach to river basin management to avoid resource-use conflicts and achieve sustainable development. ADB provided a TA to the Government to introduce this approach, with specific application to NNR.<sup>16</sup> ADB approved a loan in 2002 to help the Government implement river basin management in the NNR.<sup>17</sup> The proceeds of the loan and the grant from Agence Française de Développement (AFD) would (i) finance activities to strengthen the capacity of government agencies at the provincial and central levels, (ii) develop a river basin model, and (iii) increase coordination among the various agencies through the Water Resources Coordination Committee (WRCC). These initiatives are still in the early stages and are expected to be completed by 2009. Programs or technical assistance, such as the proposed TA, to finance specific components of river basin management, would complement the existing programs from ADB and AFD.

9. Lessons from ADB-funded hydropower projects in the Lao PDR indicate that, while the Government has made steady progress in river basin planning and project implementation, it still needs to strengthen both its financial and technical capacities to implement large-scale complex hydropower projects. An ADB TA report<sup>18</sup> in 1999 observed that, in general, few environmental and social impact assessment studies had been prepared for most of the hydropower projects that the Government considered for development. Funding agencies and multilateral institutions, including ADB, have extended technical assistance to finance impact assessment studies, including CIAs and mitigation plans, to ensure that adequate planning was undertaken for a specific hydropower project.<sup>19</sup> Given that several hydropower and mining projects are simultaneously being developed close to each other in the NNRB by different sponsors that may find it difficult to share proprietary information, it would be beneficial for the Government to undertake one cumulative impact study to cover all these projects. Moreover, while the technical capacity of government agencies has improved from various capacity-building activities, the Government would benefit from further assistance since there are not enough technically trained staff to undertake a CIA study, given the large number of hydropower projects that are currently in various stages of development and operation.

### III. THE TECHNICAL ASSISTANCE

#### A. Impact and Outcome

10. The TA will undertake the first phase of the preparatory work for the project. The main impacts of the TA will be (i) to provide an input to the sustainable development of the project, and (ii) to facilitate the implementation of an integrated NNRB management. The outcome of the TA will be the identification of cumulative environmental and social impacts caused by multiple hydropower developments in the NNRB so that mitigating measures to address such impacts are designed appropriately.

<sup>16</sup> ADB. 2000. *Technical Assistance to the Lao People's Democratic Republic for Preparing the Nam Ngum River Basin Development Project*. Manila (November).

<sup>17</sup> ADB. 2002. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Lao People's Democratic Republic for the Nam Ngum River Basin Development Sector Project*. Manila (October).

<sup>18</sup> ADB. 1996. *Technical Assistance to the Lao People's Democratic Republic for the Nam Ngum Watershed Management (Cofinanced by the Japan Special Fund and the Government of Denmark)*. Manila (TA 2734-LAO, approved on 23 December).

<sup>19</sup> ADB extended technical assistance to the Government to conduct a CIA study for the Nam Theun 2 Hydropower Project.

## **B. Methodology and Key Activities**

11. The TA will consist of two related components: (i) component A – preparation of a CIA, mitigation framework, and monitoring program; and (ii) component B – strengthening of institutional linkages for integrated river basin management to ensure that the project is prepared in accordance with integrated water resource management (IWRM) principles and ADB's water policy.<sup>20</sup> Component A will consist of two parts. Part 1 will identify cumulative impacts caused by hydropower and other development activities over the medium to long term, and part 2 will monitor the impacts identified in part 1.

12. The CIA study will (i) assess, using the river basin model jointly financed by ADB and AFD (scheduled to be ready by March 2007), the impacts of the planned development in the NNRB and specifically NN3 impacts, including downstream impacts on the NN1 reservoir and downstream to the confluence with the Mekong; and (ii) develop scenarios covering hydrology, vulnerability to flooding, social issues (i.e., resettlement, impact on indigenous people, gender, poverty, and health risks), fisheries, water quality, water supply, irrigation, biodiversity, and institutional issues. The assessment will (i) identify potential sector impacts, (ii) predict major cumulative environmental impacts, (iii) indicate threshold levels of sustainable development, and (iv) set environmental and social parameter standards and targets. The NN3 sponsors will then update the (i) environmental impact assessment (EIA) to include cumulative and downstream impacts, and (ii) the environmental and social mitigation plans and compensation measures to ensure that the impacts of the project identified by the CIA study are mitigated and satisfactorily addressed. The impacts of the other projects in the NNRB will be given to the Government for their consideration and discussion with specific project sponsors. The CIA will build on previous NNRB studies and an ongoing loan (footnotes 16–18).

13. The main CIA tasks are to (i) identify the main environmental and social issues (including poverty and gender analysis) as a result of the construction of the dam and ancillary facilities,<sup>21</sup> (ii) establish and convene an interministerial working group (IWG), (iii) further develop a profile of the basin, (iv) review current basin planning and management, (v) identify basin development scenarios, (vi) predict cumulative impacts, and (vii) design a basin monitoring program. The monitoring program will be implemented under the TA over a 2-year period, in cooperation with the appropriate government agency. Under component B, the institutional and policy regime for IWRM will be reviewed at both national and basin levels in the context of ongoing aid agency-funded activities including the Nam Ngum Watershed Management Project. Specific actions will then be proposed for consideration by the Government and funding agencies.

## **C. Cost and Financing**

14. The total cost of the TA is estimated at about \$1,158,000, of which ADB will provide \$983,000. The TA will be financed on a grant basis by the Japan Special Fund, funded by the Government of Japan. The Government of the Lao PDR will finance \$175,000 in kind by providing office accommodation, counterpart staff, and related facilities (Appendix 3). The Government has been informed that approval of the TA does not commit ADB to finance any ensuing project.

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<sup>20</sup> ADB. 2001. *Water for All. The Water Policy of the Asian Development Bank*. Manila. Philippines

<sup>21</sup> Access roads, transmission lines, quarry, spoil disposal, and resettlement sites.



## D. Implementation Arrangements

15. The project loan will be an ADB public–private sector undertaking. ADB’s Southeast Asia Department will lead the due diligence on the environmental and social aspects, while ADB’s Private Sector Operations Department will lead the commercial due diligence.

16. The TA will engage and finance 54 person-months of consulting services (27 international and 27 national). A consulting team will be engaged to conduct Component A. The quality-cost based selection method and full technical proposals will be used in recruiting the consulting firm. International individual consultants will be recruited for component B in accordance with ADB’s *Guidelines on the Use of Consultants* (2006, as amended from time to time) and other arrangements satisfactory to ADB.

17. The Department of Electricity of the Ministry of Energy and Mines will be the TA Executing Agency (EA). The director general<sup>22</sup> will lead the EA’s counterpart team. An IWG, chaired by the head of the EA, will be established with representatives from each relevant national ministry and Government departments, including provincial government representatives and the consulting firm.<sup>23</sup> The objective of IWG will be to (i) share information on basin features and developments, (ii) raise awareness about basin and social issues, (iii) establish links between different stakeholders, and (iv) identify opportunities for cooperation between stakeholders to achieve sustainable resource use. Regular meetings will help ensure that the CIA and capacity-building initiatives take into account multiple project management objectives, policies, and existing initiatives in the basin, and that major stakeholders develop an appreciation of the diverse uses and related impacts of the various activities in the basin. The IWG will also ensure that there is proper coordination between the TA and the Nam Ngum River Basin Development Project (NRBDP) financed by ADB and AFD (footnote 17), to avoid duplication of efforts or initiatives such as data collection, modeling, or capacity-building programs.<sup>24</sup> The IWG chairperson’s primary responsibility will be to facilitate TA activities, provide inputs, and review the outputs.

18. The TA will be implemented from May 2007 to November 2009. An inception report will be submitted to ADB and the Government by the end of June 2007. The report will include a work plan that will be discussed with ADB and the Government. An interim report summarizing the TA activities related to component A, part 1, will be submitted 3 months after the TA starts. The final CIA report will be submitted 3 months later. Component A, part 2, will start immediately thereafter and will run for 24 months. A TA final report will be submitted at the end of component A, part 2. Component B will take place in parallel with component A, parts 1 and 2. Individual consultants will submit their final report 6 months after their services start.

## IV. THE PRESIDENT’S DECISION

19. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$983,000 on a grant basis to the Government of the Lao People’s Democratic Republic for preparing the Cumulative Impact Assessment for the Nam Ngum 3 Hydropower Project, and hereby reports this action to the Board.

<sup>22</sup> The director general can assign the responsibility to a deputy director general in his absence.

<sup>23</sup> The EA will request nominations to IWG from the Ministry of Finance, Ministry of Agriculture and Forestry, Science Technology, and Environment Agency, WRCC, Xieng Khouang and Vientiane provinces, and the consulting firm.

<sup>24</sup> The NRBDP has been implementing several activities in the NNRB.

## DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p><b>Impact</b></p> <ul style="list-style-type: none"> <li>The NN3 project is developed in a sustainable manner.</li> <li>The NNRB serves as a model for integrated river basin management.</li> </ul>	<ul style="list-style-type: none"> <li>NN3 generates foreign exchange revenue by 2015 with minimal social and environmental costs.</li> <li>Basin management plans for NNRB are achieved by 2013.</li> </ul>	<ul style="list-style-type: none"> <li>Progress reports from lenders' advisers</li> <li>Audited financial statements from NN3</li> <li>NN3 management reports</li> <li>Reports from WRCC</li> <li>Reports from independent monitoring agencies</li> <li>ADB review missions</li> </ul>	<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>The Government is committed to develop hydropower projects in a sustainable manner.</li> <li>The Government will implement river basin management.</li> <li>The political and macroeconomic environment is stable.</li> <li>Mitigating measures are implemented in a timely manner.</li> </ul> <p><b>Risks</b></p> <ul style="list-style-type: none"> <li>Construction delays</li> <li>Failure to obtain support from relevant stakeholders at the provincial and national levels</li> <li>Availability of staff from relevant government agencies to undertake river basin management and monitoring</li> </ul>
<p><b>Outcome</b></p> <ul style="list-style-type: none"> <li>Reduction of cumulative environmental and social impacts caused by multiple hydropower and mining developments in the NNRB</li> </ul>	<ul style="list-style-type: none"> <li>NN3 performs within the sustainable environmental and social parameters and targets established by the TA.</li> <li>Environmental and social parameters and standards are met by each project.</li> <li>STEA is capable of evaluating EIA,</li> </ul>	<ul style="list-style-type: none"> <li>Progress reports from lenders' advisers</li> <li>Monitoring reports submitted by STEA</li> <li>Surveys</li> <li>ADB review missions</li> <li>Reports from independent monitoring agencies</li> </ul>	<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>Private sector sponsors of major projects in NNRB, particularly NN3, are committed to construct and operate their respective projects in a sustainable manner.</li> <li>Cooperation between the various sponsors, government agencies, and civil society is effective.</li> <li>Environmental and social programs of</li> </ul>

<b>Design Summary</b>	<b>Performance Targets/Indicators</b>	<b>Data Sources/Reporting Mechanisms</b>	<b>Assumptions and Risks</b>
	EMP, and RP.		<p>each major project in NNRB are designed to be flexible and responsive to the needs and absorptive capacity of affected people.</p> <p><b>Risks</b></p> <ul style="list-style-type: none"> <li>• Unexpectedly high environment and social mitigation costs</li> <li>• Social and environmental targets not achieved</li> <li>• Availability of qualified staff from relevant government agencies</li> </ul>
<p><b>Outputs</b></p> <p>1. CIA data and recommendations for a comprehensive mitigation and management plan to be prepared by the project sponsors will include and address measures to mitigate cumulative and downstream impacts attributable to the project.</p>	<ul style="list-style-type: none"> <li>• CIA data and recommendations for a comprehensive mitigation and management plan designed to mitigate and address all the adverse project-induced impacts identified by the CIA study</li> <li>• Data collection and analysis and recommendations made in a socially and culturally appropriate manner and in close consultation with affected people</li> </ul>	<ul style="list-style-type: none"> <li>• EIA and social management plans prepared by other hydropower and mining developments</li> <li>• Reports issued by the Nam Ngum River Basin Development Sector Project</li> <li>• Recommendations for an environmental mitigation plan</li> <li>• Recommendations for a satisfactory resettlement plan for reservoir, construction lands, and upstream/downstream impacts</li> <li>• Recommendations for a satisfactory indigenous peoples development plan</li> <li>• Recommendations for a gender action plan</li> <li>• Recommendations</li> </ul>	<p><b>Assumptions</b></p> <ul style="list-style-type: none"> <li>• The Government has the political will to implement the national policy on sustainable hydropower development and river basin management.</li> <li>• Cooperation between relevant government agencies is effective.</li> </ul> <p><b>Risks</b></p> <ul style="list-style-type: none"> <li>• Unexpected high cost of preparing environmental and social management plans</li> <li>• Failure to complete CIA studies before the major projects in NNRB (except NN3) are substantially completed</li> <li>• Insufficient Government staff available to evaluate assessment and</li> </ul>

<b>Design Summary</b>	<b>Performance Targets/Indicators</b>	<b>Data Sources/Reporting Mechanisms</b>	<b>Assumptions and Risks</b>
<p>2. Government personnel are technically capable to evaluate assessment studies and management plans.</p>	<p>The number of staff capable of evaluating assessment studies and recommendations in the EA doubles in 2009.</p>	<p>for public health action, HIV/AIDS/, human trafficking awareness plans</p> <ul style="list-style-type: none"> <li>• Monitoring reports submitted by EA</li> </ul>	<p>recommendations for mitigation and management plans</p>
<p><b>Activities with Milestones</b></p> <p><b>Component A, Part 1</b></p> <p>1.1 Establish a steering committee with representations from relevant ministries and government agencies at the provincial and national levels (June 2007).</p> <p>1.2 Conduct a cumulative impact assessment study for the NNRB (May–November 2007).</p> <p>1.3 Identify specific impacts caused by each major development in NNRB (May–November 2007).</p> <p>1.4 Set environmental and social standards and targets (October 2007).</p> <p>1.5 Decide which impacts are critical or temporary (October 2007).</p> <p>1.6 Discuss findings with steering committee and project sponsor (May–November 2007).</p> <p>1.7 Project sponsor to (i) incorporate findings, (ii) design the appropriate mitigation and other measures, (iii) prepare the necessary plans to satisfactorily address these impacts, and (iv) disclose these plans to the public (November 2007, not part of project preparatory TA).</p> <p>1.8 Government representatives to initiate discussions with all sponsors of the major developments in NNR (i.e., NN2, NN5, and Phu Bia Mine) (November 2007).</p> <p>1.9 Conduct a needs assessment study for institutional strengthening (to be implemented under component B) (November 2007).</p>			<p><b>Inputs</b></p> <p><b>ADB - \$983,000</b></p> <ul style="list-style-type: none"> <li>• Consulting services (54 person-months) - \$829,000</li> <li>• Equipment - \$25,000</li> <li>• Training - \$9,000</li> <li>• Surveys - \$5,000</li> <li>• Contingencies - \$89,000</li> <li>• Others - \$26,000</li> </ul> <p><b>Inputs Government - \$175,000</b></p> <ul style="list-style-type: none"> <li>• Office Accommodation - \$55,000</li> <li>• Staff - \$85,000</li> <li>• Others – \$35,000</li> </ul>

<p><b>Activities with Milestones</b></p> <p><b>Component A, Part 2</b></p> <p>2.1 Design a basin monitoring program (November 2007).</p> <p>2.2 Implement the basin monitoring program over a 2-year period (October 2009).</p> <p>2.3 Train government representatives in basin monitoring (October 2009).</p> <p><b>Component B</b></p> <p>3.1 Devise a capacity-building program (June 2007).</p> <p>3.2 Implement capacity-building program (April 2008).</p>	
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ADB = Asian Development Bank, CIA = cumulative impact assessment, EA = executing agency, EIA = environmental impact assessment, EMP = environmental management plan, NN2 = Nam Ngum 2 Hydropower Project, NN3 = Nam Ngum 3 Hydropower Project, NN5 = Nam Ngum 5 Hydropower Project, NNR = Nam Ngum River, NNRB = Nam Ngum River Basin, RP = resettlement plan, STEA = Science Technology and Environment Agency, TA = technical assistance, WRCC = Water Resources Coordinating Committee.

## INITIAL POVERTY AND SOCIAL ANALYSIS

### A. Linkages to the Country Poverty Analysis

<b>Is the sector identified as a national priority in country poverty analysis?</b>	<input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No	<b>Is the sector identified as a national priority in country poverty partnership agreement?</b>	<input checked="" type="checkbox"/> Yes  <input type="checkbox"/> No
<p><b>Contribution of the sector or subsector to reduce poverty in the Lao People's Democratic Republic:</b></p> <p>The Lao People's Democratic Republic (Lao PDR) is among the poorest countries in the Asian region with a per capita gross domestic product of only \$490 in 2005. The country, however, has achieved considerable progress since 1990 in reducing poverty, with the incidence of poverty falling from 46% to 32% of the population from 1992 to 2003. The country's prospects for growth have improved over time as a result of several market reforms adopted by the Government. Key sectors such as hydropower, mining, and tourism will continue to fuel the country's growth in the medium term and contribute to the objective of the Lao PDR exiting from least-developed nation status by 2020.</p> <p>Since the Lao PDR is a landlocked country and has no natural ports, its capacity to effectively participate in international trade is inhibited. It is, however, endowed with abundant natural resources, which it could export to its neighboring countries to generate much-needed foreign currency revenues. Water is the most abundant natural resource in the Lao PDR and is used extensively for hydropower generation. Hydropower represents one of the country's most important sources of foreign currency revenues, with electricity exports contributing close to 30% of the country's total export earnings in 2004. The probability of increasing electricity exports is significant since the country has harnessed only less than 5% of its hydropower potential while the demand for electricity in neighboring countries continues to rise. Revenues from hydropower projects can be used to improve basic government services, including education, health, and infrastructure primarily in poor areas of the country.</p> <p>The Nam Ngum 3 hydropower (NN3) project will contribute to the sustainable growth of the economy by increasing annual export receipts. Moreover, job opportunities for Laotian nationals will be created either directly or indirectly, thus reducing poverty. The analysis should assess the number of local employment created as a result of the project; and assess the quality of these job opportunities and compare them with the job opportunities in the country without the NN3 project.</p>			

### B. Poverty Analysis Targeting Classification: Targeted intervention (geographic intervention)

<p><b>What type of poverty analysis is needed?</b></p> <p>The NN3 project is expected to contribute to the Lao PDR's economic growth and development primarily through the export of hydropower to Thailand. Significant revenues will accrue to the Government in the form of royalties, taxes, and dividends over the 25-year operational period defined in the concession agreement. Such revenues could be applied to support the Government's poverty reduction programs.</p> <p>Under the technical assistance (TA), the poverty impact analysis (PIA) will examine the various poverty reduction programs of the Government and sources of revenues, and determine the best application of the project revenues to the Government's poverty reduction program, specifically for the communities living by the Nam Ngum River in Vientiane province.</p> <p>The PIA will be undertaken in the project area, which includes project lands, and upstream and downstream communities. It will use both quantitative and qualitative methodologies to obtain data on household characteristics and source of income; assets; access to goods and services; prices; employment; provincial poverty line in the project area; various dimensions of poverty; seasonal poverty; comparison of poverty between social and/or ethnic groups; inequality; vulnerability; and their determinates. The analysis will include immediate and cumulative impact of the hydropower project on poverty in the project area and on various social/ethnic groups, women, women heads of households, the elderly, and children. The PIA will lead to a poverty reduction strategy for the project area (project land, upstream and downstream) communities.</p>
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**C. Participation Process**

**Is there a stakeholder analysis?**  Yes  No

A preliminary public consultation was held in Bang Xiengdet villagers and some Government authorities in previous years.

**Is there a participation strategy?**  Yes  No

A thorough stakeholder analysis and a participation strategy have not yet been developed, but it would be encouraged for all aspects of the loan project preparation, including the social development plan for Ban Xiengdet, a social and environmental management framework, and an operational plan for the watershed. Extensive and frequent consultations would be carried out throughout the project preparation phase. Under the TA and during the preparation of the social and poverty assessment, data will be collected using participatory methodology.

**D. Gender Development**

**Strategy to maximize impacts on women:**

Social and poverty analysis will collect data on the social and poverty condition of women in the project area including upstream and downstream communities. Under the TA, a gender strategy will be prepared to minimize any adverse impact of the project on women, and to maximize the benefits from a poverty reduction program and capacity building training to women. The HIV/AIDS awareness campaign and prevention of human trafficking will include women. The gender strategy will be incorporated into the (i) resettlement plan, (ii) ethnic minority development plan (EMDP), and (iii) health and environment management plan.

**Has an output been prepared?**  Yes  No

**E. Social Safeguards and Other Social Risks**

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
<b>Resettlement</b>	<input checked="" type="checkbox"/> Significant <input type="checkbox"/> Not significant <input type="checkbox"/> None	<p>About 71 households consisting of approximately 500 individuals in Ban Xiengdet village at the rear of the reservoir will be resettled to a higher adjacent site. Production resources will be lost due to the development of the project, including 12 hectares (ha) of paddy below the reservoir full supply level (FSL) and another 33 ha of paddy between FSL and maximum flood level at Ban Xiengdet. Adequate land near this village can be put into cultivation to offset the loss of 45 ha of paddy.</p> <p>Although the sponsors have already developed a resettlement plan, they will need to update it by following the CIA recommendations. The resettlement plan would still have to be reviewed extensively by the Asian Development Bank (ADB) and its consultants for due diligence.</p>	<input checked="" type="checkbox"/> Full <input type="checkbox"/> Short <input type="checkbox"/> None The CIA will produce recommendations for resettlement plan to be updated by the sponsors for the NN3 reservoir.
<b>Affordability</b>	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	All power generated by the project will be exported to Thailand.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Labor	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	<p>In the NN3 project construction sites, basic facilities (water, sanitation) will be provided to the labor camps; no labor from trafficked persons and children will be used for construction and maintenance; equal wages will be paid to men and women laborers for work of equal value according to Lao PDR law.</p> <p>The NN3 project is expected to create skilled employment opportunities in the country under the power development agreement.</p>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Contractors' bidding documents will include the provision of basic facilities in the labor camp and equal wages for men and women for work of equal value.
<b>Indigenous Peoples</b>	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	<p>While it has not yet been established that the people that will be affected by the project are of ethnic origin, it is likely that they are since a large majority of the upland population are of ethnic origin. ADB will require the preparation of an ethnic minority development plan should it be established that the affected people are of ethnic origin.</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>Other Risks and/or Vulnerabilities</b>	<input checked="" type="checkbox"/> Significant <input type="checkbox"/> Not significant <input type="checkbox"/> None	<p>The NN3 project has a significant impact on the environment, displaced communities, and livelihood of the people in the project land, upstream and downstream areas. The resettlement plan, ethnic minority development plan, and environment management plan include measures to minimize some of the adverse impacts.</p> <p>The project is expected to generate revenues that could be used to finance poverty reduction programs. Without a plan or commitment from the Government, the revenues could be used for other purposes other than activities aimed at poverty reduction.</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No



**COST ESTIMATES AND FINANCING PLAN**  
(\$'000)

<b>Item</b>	<b>Total Cost</b>
<b>A. Asian Development Bank Financing<sup>a</sup></b>	
1. Consultants	
a. Remuneration and Per Diem	
i. International Consultants	574.0
ii. National Consultants	84.0
b. International and Local Travel	165.0
c. Reports and Communications	6.0
2. Equipment <sup>b</sup>	25.0
3. Training, Seminars, and Conferences <sup>c</sup>	
Facilitators	9.0
4. Surveys	5.0
5. Miscellaneous Administration and Support Costs <sup>d</sup>	21.0
6. Representative for Contract Negotiations	5.0
7. Contingencies	89.0
<b>Subtotal (A)</b>	<b>983.0</b>
<b>B. Government Financing</b>	
1. Office Accommodation and Transport	55.0
2. Remuneration and Per Diem of Counterpart Staff	85.0
3. Others	35.0
<b>Subtotal (B)</b>	<b>175.0</b>
<b>Total</b>	<b>1,158.0</b>

<sup>a</sup> Financed by the Japan Special Fund, funded by the Government of Japan.

<sup>b</sup> Hydrometeorological and water quality monitoring equipment. The equipment will be transferred to the government agency that will continue monitoring the basin after the TA is completed.

<sup>c</sup> Includes holding of workshops, and preparing material for public information and dissemination material.

<sup>d</sup> Includes local transportation costs.

Source: Asian Development Bank estimates.

## OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The implementation of the technical assistance (TA) will require the services of a multidisciplinary team of international consultants engaged as individuals and through a consulting firm. The TA will consist of two components. Component A consisting of two parts will require about 21 person-months of international consulting services from the consulting firm and about 27 person-months from national consultants. Component B will require about 6 person-months of individual international consultants with expertise in the environment and river basin management.

### A. Component A, Part 1: Cumulative Impact Assessment

2. The cumulative impact assessment (CIA) study has the dual objective of (i) providing input to the environmental impact assessment (EIA) for the Nam Ngum 3 (NN3) hydropower project to be prepared by the sponsor, and (ii) providing a core planning tool for the integrated management of the Nam Ngum river basin (NNRB) by the Government of the Lao People's Democratic Republic (Lao PDR). The CIA will assess the construction and operation impacts of NN3 on key basin values, as well as the effects of all other development and activity in the basin that are likely to impact on the same key basin values affected by NN3.

3. Key cumulative basin impact issues associated with NN3 will be identified. The main impacts of major existing or proposed developments (not limited to hydropower alone) in the basin will be identified from (i) environmental monitoring data and studies, (ii) EIAs and environment management plans, (iii) incident reports, (iv) basin management plans, (v) discussions with Government agencies, (vi) project owners and affected people, and (vii) other information sources.

4. The initial scope of the study will include (i) spatial and temporal considerations, (ii) potential development scenarios, and (iii) key issues and questions. The study will cover a range of growth possibility and address the key issues and cumulative impacts likely to be faced in these scenarios. The consultant will refine this scope if required as the CIA progresses.

- (i) **Spatial coverage.** The CIA will assess impacts within the entire NNRB down to the Mekong confluence. External influences that create significant direct impacts in the basin will be accounted for in the assessment (e.g., interbasin water transfer), while any external areas identified as having a significant impact on basin values will also be addressed. The basin was selected as the boundary for the CIA as it covers the influences on Nam Ngum river hydrology, the main basin value that will be affected by NN3.
- (ii) **Temporal coverage.** The CIA will evaluate recent trends and the existing condition of the basin, as well as potential impacts for a 6-year planning horizon (2008–2013) and a 20-year horizon (2007–2027). The 6-year horizon includes the start of operation of NN3, due in 2013, while the 20-year horizon matches the long-term time frame commonly used in planning studies undertaken at the regional, national, and/or sectoral levels by the Mekong River Commission and the Government. The consultant will also provide, when possible, quantitative longer-term projections based on anticipated trends.
- (iii) **Development scenarios.** The consultant will examine the cumulative impacts of NN3 in two development scenarios: (a) the “business as usual” development pattern, based on the aggregate of all proposed developments including NN3; and (b) the “without NN3” scenario. The consultant will consider plans and likely developments across the sectors of hydropower, irrigation and water supply, agriculture, fisheries,

forestry, mining, industry, transport, social and urban development, and conservation.

- (iv) **Key issues and questions.** The CIA will assess the cumulative impacts of NN3 and development scenarios, covering hydrology, vulnerability to flooding, social issues (i.e., involuntary resettlement, loss of income, ethnic minorities, and health risks including risk of HIV/AIDS), fisheries, water quality, transport, water supply and irrigation, urban development, institutional issues, and biodiversity.
- (v) **Conclusions of the study.** The findings of the CIA study will serve as a guide for the preparation of medium- and long-term plans by (a) institutions in the project's immediate area of influence, (b) provincial departments, and (c) the national Government. Major outputs of the study will include (a) a comprehensive list of the cumulative impacts of proposed hydropower development in the NNRB, specifically the contribution of NN3; (b) an updated detailed environmental and social mitigation plan that would be prepared by the sponsors and would address cumulative and downstream impacts; and (c) recommendations for stakeholders to better address the identified impacts and improve their planning and programs.

5. The CIA study will require 26 person-months of consulting services (17 international and 9 national). The scope of work includes but will not be limited to the tasks listed for each consultant.

**1. Team Leader and Environmental Specialist** (international, 4.0 person-months – one expert)

- (i) Develop a comprehensive environmental and social profile of the basin, based on work already done under the Nam Ngum River Basin Development Sector Project (NNRBDSP).
- (ii) Assess the significant cumulative environmental and social impacts of the predicted developments for the 2013 and 2027 scenarios, including hydroelectricity, mining, and irrigation.
- (iii) Develop a vision for sustainable natural resource use in the NNRB, specifying the types of acceptable development and recommending appropriate levels.
- (iv) Develop a long-term basin monitoring program to monitor the key environmental features likely to be affected by major developments.

**2. Engineering Hydrologist or Water Resources Management Specialist** (international, 2.0 person-months – one expert)

- (i) Review the designs and status of existing, under construction, and proposed hydroelectric projects and other major water resource activities in the NNRB.
- (ii) Review the river basin hydrological and the hydropower simulation and optimization models being developed at the Department of Electricity, under the NNRBDSP. Assess the cumulative impact on river hydrology, estimating flow change variations and flooding potential.
- (iii) Predict the most likely hydropower development scenario in the basin in 2013 and 2027 as well as any other major water resource developments or activities in the basin that are likely to affect river flow rates during those periods.

**3. Water Quality Specialist** (international, 1.0 person-month)

- (i) Review available water quality data for the NNR and its tributaries and NN1 releases, as well as any water quality studies in the basin and reported incidents that have affected basin water quality. Describe the likely water quality changes that may be created by NN3 over time, the effectiveness of the proposed measures for mitigating this impact, and the contribution of this project to the basin cumulative impact in 2013 and 2027.
- (ii) Recommend measures to mitigate water quality changes from hydropower projects and develop a water quality monitoring program.

**4. Aquatic Ecologist** (international, 1.5 person-months)

- (i) Review existing information on basin aquatic ecosystems (including the NN2 and NN3 EIAs), aquaculture and fishing. Describe current aquatic ecology and trends in aquaculture and fishing in the basin. Predict fisheries developments in the basin in 2013 and 2027.
- (ii) Recommend measures to mitigate identified impacts, with emphasis on the flow rate, timing, and quality of releases from hydropower projects; and develop a fish monitoring program for the basin that incorporates current monitoring as well as proposed monitoring at NN2 and NN3.

**5. Terrestrial Ecologist and Vegetation Specialist** (international, 1.0 person-month – one expert)

- (i) Review the latest information on basin vegetation cover including satellite imagery and historic data for at least the last 30 years. Give an overview of the conservation values of the Phou Khao Khouay National Park (likely alignment of transmission line) and identify, if any, areas of high conservation value elsewhere in the basin.
- (ii) Recommend measures to reduce the loss of native vegetation or increase the quality of existing cover, including conservation measures in existing protected areas and other areas with high conservation value.

**6. Land Management and Irrigation Specialist** (international, 1.5 person-months – one expert)

- (i) Review available land cover and management data. Describe land-use practices and land cover in the basin, quantifying land use by area and describing recent trends and influences.
- (ii) Assess the cumulative impacts of the predicted change in land use for the 2013 and 2027 development scenarios, and recommend measures to mitigate land-use impacts.

**7. Social Development and Gender Specialist** (international, 1.5 person-months)

- (i) Review and describe the current social systems in the basin in relation to the impact issues associated with NN3.
- (ii) Predict likely changes to the social structure and economic well-being of households in the 2013 and 2027 development scenarios, including short- to medium-term impacts from project construction, and the NN3 contribution to these impacts.

Describe the potential impacts on different social groups. Recommend measures to mitigate project-specific and cumulative impacts.

**8. Ethnic Minorities Specialist** (international, 1.0 person-month)

- (i) Review and describe the current ethnic minority composition among those likely to be affected by the construction of NN3.
- (ii) Predict likely impacts to the social structure of ethnic minority groups in the 2013 and 2027 development scenarios, including short- to medium-term impacts from project construction, and the NN3 contribution to these impacts. Recommend measures to mitigate project-specific and cumulative impacts.

**9. Poverty Impact Assessment Specialist** (international, 2.0 person-months)

- (i) Review the Government's policy documents and its poverty program in the project area; review budget allocations and pro-poor government policies to assess the impact of hydropower export on financing poverty reduction programs.
- (ii) Conduct field surveys and focus group interviews using participatory methodologies, collect quantitative and qualitative data on the population's economic parameters.
- (iii) Prepare a summary poverty impact assessment (PIA).

**10. Public Health Specialist** (international, 0.5 person-months)

- (i) Review available data on and describe the current health status of the basin population. Identify likely project-specific impacts on health from existing developments.
- (ii) Assess likely impacts on health from the 2013 and 2027 development scenarios. Describe the NN3 contribution to these overall health impacts.
- (iii) Recommend measures, including implementation arrangements, to mitigate project-specific and cumulative health impacts, and promote the health and safety of the affected population as well as workers involved in the project.

**11. GIS Specialist** (international, 1.0 person-month)

- (i) Obtain and review available geographic information system (GIS) layers and other relevant mapping of the basin (topography, infrastructure, land use, vegetation cover, etc.) from the Government, projects, and other sources.
- (ii) Prepare key GIS layers to illustrate environmental and social basin profile information and the 2013 and 2027 development scenarios.

**12. National Consultants** (9 person-months)

6. A team of up to five national consultants will assist the international specialists in preparing the CIA. The consultants will consist of an environment specialist; an engineering hydrologist; an aquatic ecologist; a terrestrial ecologist/vegetation specialist; and a social, gender, and poverty impact specialist. The consultants will have a detailed knowledge of the Lao People's Democratic Republic conditions and law, as well as knowledge of NNRB.

**B. Component A, Part 2: Monitoring Program Implementation**

7. A basin monitoring program will be designed and agreed on under part 1 for key environmental value indicators. At a minimum, it will monitor river flows, water quality, and fish species at selected sites. The program will take into account (i) the location of existing and likely developments, (ii) the type of impacts and risks that different developments pose, and (iii) the monitoring requirements imposed on different sector developments. The monitoring program will (i) be implemented in coordination with the monitoring programs of the various sponsors, and (ii) incorporate current Government programs and institutional arrangements, as appropriate, to standardize methods and avoid repetition. The program will be implemented by Government representatives with assistance from the consultants during the initial 2 years. The program will include an incident reporting system to ensure that a correlation can be made between incidents and recorded data. Automated river gauging stations will be established or strengthened, where necessary, with monitoring procedures documents and training provided to the Government. Collected basin-wide data will be collated and published. The program will be implemented by Government representatives with assistance from the consultants during the initial 2 years. The monitoring program will require 22 person-months of consulting services (4 international and 18 national). The monitoring team will consist of (i) an international team leader/environment specialist, (ii) water quality specialists (one international and one national), (iii) aquatic ecologists (one international and one national), and (iv) a national hydrologic field specialist.

**C. Component B: Institutional Strengthening on River Basin Management and Integrated Water Resource Management**

8. A review of Government policy, legislation, sector plans, and development programs that apply to the environmental and social management of the basin, integrated water resource management (IWRM) and river basin management will be undertaken in the context of the water and other sector policies of the Asian Development Bank (ADB). The capacity of Government agencies to manage a sustainable basin development program in the NNRB will be assessed, taking into account the ongoing aid agency-funded projects and programs. Gaps, contradictions, lack of coordination, and weaknesses in policy, funding agency assistance, and implementation will be identified. This will include the effectiveness of the management and monitoring of individual projects in accordance with IWRM principles. On the basis of the review, a strategy and a set of initiatives will be proposed for consideration by the Government and other funding agencies active in the river basin. The individual consultant under component B will also comment on the CIA recommendations from an IWRM perspective and make project-specific recommendations for the design of the NN3 Project to ensure that it is prepared in accordance with IWRM principles and relevant ADB sector policies. Component B will require 6 person-months of international consulting services.