China’s Involvement in Hydropower Development and its Implications for the Mekong Region: Case Studies of Two Projects in Laos

By

Yi-Ying Lee

Dr. Dalia Patino Echeverri, Advisor

April 2012

Submitted in partial fulfillment of the requirements of the Master of Environmental Management degree in the Nicholas School of the Environment, Duke University

2012
Abstract

The rapid expansion of China’s involvement in hydropower development in the Mekong region has led to growing global concern over its dam building practices. While dam construction certainly has many beneficial aspects for the Mekong countries, it also poses major threats to the ecological system and to the livelihoods of the local communities. This masters project presents a literature review of negative impacts of large hydropower dams in the region and examines the ways in which current project development practices, and in particular the approaches taken by Chinese state-owned companies and financiers, contribute to the continuation of these negative effects. With a focus on Laos, two case studies are presented and examined using the Hydropower Sustainability Assessment Protocol (HSAP). Based on these case studies, the major impediments to reducing the negative environmental and socio-economic impacts of Chinese investments in hydropower projects in the Mekong region and in Laos specifically are identified, along with possible ways in which the World Wildlife Fund and other non-governmental organization can act to weaken these impediments.
# Table of Contents

1. Introduction & Objectives ......................................................................................................1

2. Methods ...................................................................................................................................2

3. China’s Role in Hydropower Development in the Mekong Region .......................................5
   3.1 A Brief History of Hydropower Development in the Mekong .........................................5
   3.2 Drivers of Chinese Overseas Hydropower Investment in the Mekong ............................6
   3.3 Key Chinese Stakeholders ..............................................................................................7
   3.4 Chinese Hydropower Investment in Lao PDR ...............................................................8
      3.4.1 Environmental Impact Assessment (EIA) ...............................................................9
   3.5 Environmental Impacts of Hydropower Dams .............................................................10
   3.6 Socio-economic Impacts of Hydropower Dams ............................................................11

4. Case Studies of Chinese-built Hydropower Dams ...............................................................12
   4.1 Nam Tha (NT1) .............................................................................................................12
      4.1.1 Location, Demographic and Economic Activity Description ................................12
      4.1.2 Key Actors Involved ..............................................................................................13
      4.1.3 Technical Specifications, Financing and Timeline ................................................14
      4.1.4 Criticisms of the Assessment of Environmental and Socio-Economic Impacts ....15
      4.1.5 Results from the HSAP Analysis ...........................................................................17
   4.2 Nam Ngum (NN5) .........................................................................................................18
      4.2.1 Location, Demographic and Economic Activity Description ................................18
      4.2.2 Key Actors Involved ..............................................................................................19
      4.2.3 Technical Specifications, Financing and Timeline ................................................20
      4.2.4 Environmental Impact and Socio-Economic Assessment by Sinohydro ...............21
      4.2.5 Criticisms on the Potential Environmental and Socio-Economic Impacts ............22
      4.2.6 Results from the HSAP Analysis ...........................................................................24

5. Conclusion and Recommendations ....................................................................................25

Appendix ...............................................................................................................................29
   Table A – HSAP ES – Early Stage (Nam Tha 1) ...................................................................29
   Table B – HSAP P – Preparation (Nam Ngum 5) ..............................................................33

References ..................................................................................................................................39
1. Introduction & Objectives

With its growing involvement in the overseas hydropower industry in recent years, China has become a global leader in shaping the development of hydropower dams. This phenomenon is mainly driven by China’s dramatic economic growth and industrialization, the ongoing transformation of its hydropower sector, as well as its “go global” strategy and related policies. Data available as of January 2012 indicate that Chinese companies and funding institutions are participating in construction of about 300 dams in 66 countries (USCC 2012). These construction projects are focused especially on Southeast Asia (127 projects) and, to a lesser extent, Africa (86 projects) (USCC 2012). In particular, China has a history of relationship building with its southern neighboring countries, traditionally through foreign aid assistance and more recently through direct foreign investment and trade agreements (Li 2010), which further enables China to play a large role in the hydropower development in Laos, Burma/Myanmar, Thailand, Cambodia and Vietnam in the Mekong region. The objectives of this masters project are to identify major impediments to reducing the negative environmental and socio-economic impacts associated with Chinese-built hydropower dams in the Mekong, and to suggest ways in which the World Wildlife Fund (WWF) and other non-governmental organizations might act to weaken some of these impediments.

The Mekong region is generally considered to be among the most ecologically complex and diverse areas of the world, and dam development in the region is therefore a high-priority conservation issue for the WWF (WWF 2012a). The WWF states that the Mekong region consists of more than 200 million acres, and that in the Mekong River itself there are over 1500 different species of fish (WWF 2012b). The human population involves more than 95 different ethnic and native groups (WWF 2012b), and the total population in the lower Mekong is about
60 million, with the main source of protein (roughly 80 percent) coming from the river (IR 2012a). The Mekong River plays a vital role in the livelihoods of the people and the extraordinary ecological system that depends on it. According to a recent report, there will be a “devastating impact” on millions of people, both with regard to food supply and income, if current hydropower activities in the Mekong river basin continue (Pearse-Smith 2012).

Currently, there are a number of hydropower projects involving Chinese companies and financiers in the Mekong, some of them having already been completed while more are under construction or in planning stages. Although China has a long history of dam construction experience, there is a growing concern over Chinese financial institutions and companies having stepped in to fund projects that were previously funded by international financial institutions such as the World Bank and the Asian Development Bank (Hirsch 2011). Whereas the funding from the World Bank and the Asian Development Bank came with pressures on the different governments to ensure proper assessment of social and environmental impacts (Campbell 2011), it is not clear to what extent acceptable practices and standards will be followed by their Chinese counterparts. As the Chinese government promotes the outward expansion of the Chinese engineering projects overseas, there is evidence that projects like the proposed dams on the Salween River in Burma, and the Kamchay Dam in Cambodia all come with serious social and environmental costs (IR 2008a).

2. Methods

The research methodology and analysis is based largely on a review of current literature including peer-reviewed journal articles, publications from independent authors, non-government organizations (NGOs), intergovernmental organizations, news reports, other information found on the Internet, as well as the Hydropower Sustainability Assessment Protocol (HSAP) for
assessment purposes (IHA 2010). Two Chinese-built hydropower dams in Laos - Nam Tha 1 (NT1) and Nam Ngum 5 (NN5) - are selected for case studies, and the information gathered for these two dams are analyzed within the framework of the HSAP. These two Chinese projects in Laos were selected for two reasons. First, attention is focused on Laos because it is widely expected to become the “battery of Asia” through hydropower development. Second, there are currently plans to build eleven hydropower dams on the mainstream of the Mekong River. These projects are located at Pak Beng, Luang Prabang, Xayaburi, Pak Lay, and Sanakham in northern Laos; Pak Chom and Ban Koum on the Thai-Lao border; Lat Sua and Don Sahong in southern Laos; and Stung Treng and Sambor in Cambodia (IR 2012b). Since four of these hydropower dams will be developed by Chinese companies, and plans are for three of these to be located in Laos and one in Cambodia, attention is focused on two specific projects in Laos as representative of Chinese hydropower involvement in the region. The two projects are examined using the HSAP for the purpose of identifying the major impediments to reducing the negative environmental and socio-economic impacts of Chinese investments in hydropower development in the Mekong.

The HSAP is a recently established framework for assessing the sustainability of hydropower development and operation. It was developed through the joint efforts of the International Hydropower Association, The Nature Conservancy, The World Bank Group, The World Wildlife Fund (WWF), a range of other government agencies, and commercial and development banks (IHA 2010). The protocol was under development from 2007-2010, and it was officially launched on June 2011 after the International Hydropower Associate adopted it in November 2010 (IHA 2012). The protocol consists of four documents - Early Stage, Preparation, Implementation, and Operation - each representing a different life-cycle stage in hydropower
development. It can be used to prepare a single stand-alone document applying to one particular stage in the development. For each stage there is a set of topics to be considered in order to assess the sustainability of a project at that particular point of the life cycle; some of the topics are based on an integrative perspective on environmental, social, technical and economic/financial factors (IHA 2010). According to the HSAP, the Early Stage tool can be used for risk assessment as well as for identifying opportunities for recognizing challenges posed by a project and for forming proper management responses early on, before the project advances to a point requiring detailed investigation. This tool may also be used for the purpose of identifying opportunities in the context of improving the sustainability of hydropower investments. The other three assessment tools have grading spectra, so that scores can be assigned through examination of the practices employed at these stages (IHA 2010). The purpose of the Preparation assessment tool is to determine whether preparatory work is undertaken properly and whether the managing processes and plans are being set up appropriately (IHA 2010). The Implementation assessment tool helps to check whether all the management plans are implemented accordingly, and lastly, the Operation assessment tool can be used to determine whether the dam is operating sustainably with proper monitoring, compliance and improvement measures (IHA 2010).

This document is organized as follows. In Section 3 China's role in hydropower development in the Mekong region is reviewed, beginning with some historical background. The main drivers and the key stakeholders in Chinese hydropower investments in the region are described. Attention is then focused on Chinese hydropower investments in Laos and their environmental and sociological ramifications. Some ecological impacts of hydropower dams as documented in the literature are reviewed, along with those impacts that are especially relevant
for the Mekong region. Socio-economic effects of hydropower dams are also reviewed, again with special emphasis on their impacts in the Mekong region and Laos in particular. As very recent developments in connection with Chinese hydropower investments in Burma/Myanmar make clear, there is a need and a role for more community involvement regarding hydropower development, although obviously such involvement may be much more difficult in non-democratic countries such as the People’s Democratic Republic of Laos. The two case studies of China-built hydropower dams in Laos, the NT1 and NN5 dams, are presented in Section 4. The technical specifications, financing, and timelines for the two dams are summarized, and issues that have been raised relating to their construction and their environmental and socio-economic impacts are discussed. The analyses of the two case studies through using the framework of HSAP will be presented. Section 5 summarizes the conclusions drawn from this project and includes recommendations for reducing the impacts of Chinese hydropower investments in the Mekong region.

3. China’s Role in Hydropower Development in the Mekong Region

3.1 A Brief History of Hydropower Development in the Mekong

The Mekong River, the longest river in Southeast Asia, covers about 4800 km; starting at the Tibetan Plateau, it flows through the Yunnan province of China, parts of five lower Mekong countries, and then into the South China Sea (WWF, 2010). Although hydropower dam construction certainly produces much needed energy for the development of the Mekong countries, it is also considered to be one of the major threats to the ecological system and to the people whose livelihoods depend on the natural cycles of the Mekong River.

There have been plans for hydropower dams in the Mekong region for about six decades, and much of the planning up to 1975 had focused on the building of a cascade of large dams on
the Mekong River mainstream, but the Cold War subsequently put these development projects on hold (Hirsch 2010; Hirsch 2011). After the Cold War, the demand for natural resources and energy was growing in the region -- Thailand began seeking sources of electricity from its neighbors while Laos sought to enhance its income from the sale of some of its natural resources (Hirsch, 2010). Throughout the 1980s, global-level concern over the social and environmental impacts of large hydropower dams received increasingly more attention (Hirsch 2010), and these concerns grew as mainstream dam projects became increasingly part of the agenda of the early 1990s (Hirsch 2011). Development of hydropower dams in the Mekong region accelerated after 2000, and in 2007-2008 mainstream dams that were earlier thought to be "simply too destructive" came on the scene again "in a big way" (Hirsch 2010). According to Hirsch, there were as of 2010 over 120 tributary and mainstream projects on the Mekong, including those either under construction or already in operation, and in addition there were proposals for 11 more mainstream dams (Hirsch 2010).

3.2 Drivers of Chinese Overseas Hydropower Investment in the Mekong

As pointed out by Hirsh, "until the 1990s, most dams in the lower Mekong countries public investments based on loans from the World Bank and the Asian Development Bank" (Hirsch 2011). In recent years, the trend has clearly been for China to play an increasingly major role as an investor in dam development in the region. It is estimated that up to 40 percent of the proposed hydropower developments on both tributaries and the mainstream in Cambodia, Laos, Thailand and Vietnam in the coming year will be carried out by Chinese companies (Hirsch 2011). There are several factors driving these Chinese investments in the Mekong. First of all, China’s banking and construction institutions, as well as its energy and power sectors, are undergoing liberalization and privatization representing a dramatic shift away from the
traditional, purely state-owned-and-operated services, and Chinese companies are now concerned with making profits rather than simply conforming with the needs of China’s economic development (Li 2010). This phenomenon has led to the “corporatization” of China’s hydropower sector and to a surge in both domestic and overseas dam building as power companies are moving quickly to secure existing assets and develop new ones (McDonald et al. 2008). China’s environmental laws have been implemented and strengthened within the past 10 years (McDonald et al. 2008), and with rising competition, constraints and costs on domestic hydropower projects due to environmental and resettlement issues, Chinese power companies are finding it increasingly advantageous to seek opportunities overseas (Li 2010).

In addition, the expansion of China’s dam industry is motivated by the Chinese government’s policy of “going out” which promotes outward investment, exports, and subcontracting in overseas engineering projects (McDonald et al. 2008). As a result, China’s foreign direct investment increased 65.5% per year between 2000 and 2005 (McDonald et al. 2008). Furthermore as pointed out by Li, China as the "world's factory, needs energy and natural resources for its industrial production, the country’s foreign aid is not only used for securing diplomatic ties, but also business tools to advance overseas economic activities” (Li 2010). The shift from foreign aid to investments also helps Chinese banks, construction and power companies to take advantage of the strong bilateral relations with the Mekong countries and to secure steady contracts for hydropower projects (Li 2010; McDonald et al. 2008).

### 3.3 Key Chinese Stakeholders

The involvement of Chinese companies in dam planning and construction includes funding the projects, developing and building the dams, and supplying dam construction equipment. (McDonald et al. 2008). A number of Chinese banks and companies are involved
specifically in hydropower development in the Mekong. Two of the major ones are the China Exim Bank and the China Development Bank. China Exim Bank provides funding for a number of controversial large dam projects worldwide, especially in Southeast Asia and Africa. It is China’s official export credit agency and since its establishment in 1994, China Exim Bank has become the world’s largest export credit agency (IR 2012f). China Development Bank is another one of China’s policy banks that is increasingly involved in the financing of foreign energy projects. (McDonald et al. 2008).

Although the Chinese financers have been criticized for their weak environmental and social policies in pushing for sustainable investment practices (IR 2012g), there is still a growing trend in recent years for Chinese companies to provide funding for large dam projects, sometimes with their own credit lines (McDonald et al. 2008). For example, Sinohydro, a giant state-owned company, acts as the developer and builder, as well as an investor for the Nam Ngum 5 project along with many of its dam-building projects (McDonald et al. 2008). Other state-owned dam-building companies, such as China International Water and Electric Corporation and China National Heavy Machinery Corporation, also have financial investments in the Mekong (McDonald et al. 2008). For example, China Southern Power Grid, a provincial-level, state-owned enterprise, is also involved in a number of large scale dam projects in the Mekong region (McDonald et al. 2008). These Chinese companies and financial institutions are representative of the role of China as both a builder and a major financier in the hydropower industry in the Mekong region.

3.4 Chinese Hydropower Investment in Lao PDR

Lao PDR is a poor, landlocked country with a population of about 6.2 million as of 2010 (WB 2012). However, the country has a substantial exploitable hydropower potential of about
23,000 MW, and as of 2010, about 1,838 MW of hydropower generation capacity has been installed, with another 1,372 under construction, 3,041 MW in the advanced planning stage with commissioning targeted before 2015, and more than 3,300 MW with completed feasibility studies (Fraser 2010). With much untapped hydropower potential, Lao PDR is expected to be the main hydropower exporter in the Mekong (Mehtonen 2008). Chinese financiers and companies are involved in 14 hydropower projects in Laos as of January 2012 (IR 2012c). Although the Chinese have a long history of dam development, major Chinese investors, financiers and equipment suppliers developing dams overseas have been criticized for not yet adopting environmental and human rights policies in line with the international standards (McDonald et al. 2008). Furthermore, Lao PDR has inadequate enforcement of environmental laws and an undemocratic political system (Lebel et al. 2007). All these factors combine to impede opposition by the local populations against the negative impacts of hydropower projects. In the hydropower industry, Environmental Impact Assessment (EIA) is often a requirement for lending especially for projects funded by World Bank and the Asian Development Bank (Campbell 2011). In the following section the role of EIA in the context of Lao PDR is briefly described.

### 3.4.1 Environmental Impact Assessment (EIA)

The EIA is generally regarded as one of the primary tools for conducting the potential environmental and social impact assessments of hydropower projects; however, it does not require the decision makers to select the least harmful options, as long as the agency that prepares the report complies with the EIA procedures and produces a comprehensive report (Campbell 2011). The intended purpose of the EIA is to educate decision makers on the potential impacts of a proposed project, as well as to identify impacts of the project and
alternative options (Campbell 2011). EIA is a Western concept and tool intended to be applied in a society that is open to public involvement, and its effectiveness obviously demands freedom of information. In Laos in particular, the EIA processes are conducted with a lower degree of public involvement than is expected within the framework of hydropower projects (Campbell 2011). Therefore, the negative environmental and social impacts are more difficult to assess and mitigate.

3.5 Environmental Impacts of Hydropower Dams

The potential adverse environmental impacts associated with large dam development are diverse, and many of the impacts are long-term since the dams exist and operate over many years. According to the World Bank, some of the irreversible environmental impacts that cannot be fully mitigated include (Ledec & Quintero 2003):

“(i) irreversible biodiversity loss, if critical natural habitats not occurring elsewhere are submerged (or left dry) by the dam; (ii) fish passage facilities frequently cannot restore the pre-dam ecological balance of a river, in terms of species composition or fish migrations.”

The loss of aquatic biodiversity is certainly a major concern for the Mekong River since it is a unique habitat for many fish species. The impact on the loss of upstream and downstream fisheries can be major because the blockage of dam affects the migratory patterns of fish, as well as the natural movement of sediment to replenish nutrients necessary for productivity and composition of species. Furthermore, sedimentation appears thus far to be an unsolvable problem which not only shortens the lifespans of dams but which can also be very costly (WWF 2012c).

For the Mekong region, the potential impacts of hydropower development on downstream reservoir fisheries and aquatic diversity can be understood from the operation of the
Nam Ngum 1 (NN1) dam located downstream from NN5. It was the first hydropower dam to be built on the Nam Ngum River and it was also the first dam to be built in Lao PDR (1971). A document published by the Mekong River Commission (MRC), an inter-governmental agency that promotes sustainable development of the Mekong River, has indicated that water released downstream from the NN1 reservoir is unfavorable for aquatic life most of the year due to reservoir stratification and low dissolved oxygen levels (Schouten 1998). Furthermore, all reservoirs that have a depth of more than 12 meters and a draw-down zone of more than 10 meters can be expected to have significant effects on downstream aquatic life as a result of the release of low-quality water from the bottom water layer (Schouten 1998). Regarding fish species in the reservoir, it has been noticed that some of the fish species that were recorded before closure of the dam are no longer being observed in the Nam Ngum River, and some fish species cannot establish a reservoir population at all due to the habitat modification and the blockage of migration (Schouten 1998).

3.6 Socio-economic Impacts of Hydropower Dams

While hydropower dams can certainly be beneficial to the social and economic development of a country, there are at the same time significant direct and indirect socio-economic impacts associated with them. One of the most direct impacts is the relocation and resettlement of human populations, which can cause major social, cultural, and economic disruptions. There are also indirect impacts on the downstream communities that rely on the natural floodplain to support agriculture and fisheries (WWF 2012c). In order to mitigate the socio-economic cost of dam construction, public participation by the affected communities in the decision-making process is crucial. However, the affected population's involvement can be difficult in less developed countries in which public participation is discouraged and the
population is less educated on the relevant issues (Campbell 2011). In Laos specifically, there is very little opportunity for the people to express their concerns and negotiate change (Campbell 2011).

4. Case Studies of Chinese-built Hydropower Dams

The Chinese are currently planning to develop four hydropower dams on the mainstream of the Mekong, and three of these dams will be located in Laos. This project focuses on the two hydropower dams with Chinese involvement in Laos, Nam Tha 1 (NT1) and Nam Ngum 5 (NN5), and considers in particular their potential social and environmental impacts and the key stakeholders of the projects. Based on these case studies, along with other findings through utilizing the HSAP tool, some suggestions are made in the last section as to how Chinese companies and financiers might be encouraged to reduce the negative environmental and socio-economic impacts of their dam projects.

4.1 Nam Tha 1 (NT1)

4.1.1 Location, Demographic and Economic Activity Description

The NT1 hydropower project is at the construction stage and is located upstream of the Nam Tha confluence with the Mekong River in the Bokeo Province (See Map 1). The reservoir of NT1 is expected to flood parts of the Bokeo and Luang Namtha Provinces at the northwestern mountainous parts of Lao PDR, as well as some historical sites in the area (LV 2011) (See Map 2). Bokeo Province is a rich mining center for gold and sapphire, and it is home to a large number of ethnic minorities with more than 400 villages (LNTA 2008a). Luang Namtha Province is well known for its ethnic diversity and indigenous cultures, and is home to more than 20 different ethnic groups. The main industries in Laung Namtha are agriculture, wood processing, lignite and copper mining, handicraft production, transportation and tourism (LNTA
Most people are engaged in agriculture, and forest products are also key sources of income for the rural population (LNTA 2008b).

Map 1: Nam Tha 1 Dam Location Circled in Red & Some of the Dams Over 10MW in the Northern Part of Laos (IR 2012e)

4.1.2 Key Actors Involved

The main financier and builder of the NT1 project is the China Southern Power Grid (CSPG), a Chinese provincial-level-state-owned enterprise that is also involved in the Sambor Dam planned to be built on the mainstream of the Mekong River in Cambodia. Electricite Du Laos is also a minor stakeholder in the project. The Chinese state-owned enterprise, the Guangxi Electric Power Industry (GXED), designs and develops the NT1 project.
Unlike the NN5 project, the EIA report of NT1 was not found to be published for public access. However, it is reasonable to assume that the regulatory agencies will function in a manner similar to those for the NN5 project, since the project is located in Laos and the agencies within the Laotian government are likely to be the main regulators of the project. Other third parties such as International Rivers and other NGOs, as well as other public interest groups, have been vocal in criticizing the NT1 project.

4.1.3 Technical Specifications, Financing and Timeline

NT1 is a 93-meter-high dam with an installed capacity of 168 MW, and its reservoir is estimated to cover an area of 62 km$^2$ with a narrow body of water stretching back 90 km from the dam (IR 2008b). The NT1 project was first considered in the early 1990s, but was regarded as a low priority due to projected high costs and low potential returns on investment (IR 2008b). It is only in recent years that the project has been carried forward by the China Southern Power Grid (CSPG) as an 85% stakeholder and the government of Lao as a 15% stakeholder, with a project cost of about US $340 million (IR 2012c). CSPG expects to invest $2 billion yuan ($316.9 million USD) in NT1. The project is being developed under the Build-Operate-Transfer (BOT) model, and the operating company will run the project for 30 years; the project feasibility study, design and development have been undertaken by a Chinese state-owned enterprise, the Guangxi Electric Power Industry (GXED), and the initial EIA and Social Impact Assessment (SIA) were subcontracted by GXED to Earth Systems Lao, an environmental consultancy firm (IR 2008b). The earliest memorandum of understanding (MoU) was signed by CSPG and the Lao government in August 2006, followed by a pre-feasibility done by GXED and approved by CSG in late November 2006 (IR 2008b). The construction of the 40-km access road started in January 2008, and the expected power generation date for NT1 was in 2012 (IR 2008b).
However, it was announced in February 2011 that the project would be delayed indefinitely as, according to news reports, it would require too many villages to be relocated (LV 2011).

4.1.4 Criticisms of the Assessment of Environmental and Socio-Economic Impacts

The NT1 project has raised concerns over its apparently rushed environmental and social studies, especially regarding resettlement issues and the impacts on the local downstream communities (IR 2008b). In 2008, IR pointed out several inadequacies in the EIA and SIA done by GXED: not only did the assessments fail to address impacts on water quality and living aquatic resources, but the report also failed to identify any impacts on the communities situated along the river. Meanwhile, IR estimated the project would require the resettlement of almost 8,000 people from 1,379 households in 34 villages, most of them being ethnic minorities (IR 2008b). Later, in February 2011, a news report suggested that between 10,000 and 30,000 people would need to be resettled in order for the project to continue, and there was no adequate resettlement location identified at the time. As a result, the director-general of the Energy Promotion and Development of Lao Energy and Mines Ministry announced a halt to the NT1 project until further studies that were needed could be conducted (LV 2011).

The uncertainty regarding resettlement location for the villagers is clearly a problem that should have been addressed prior to the start of the construction. In addition, many of the villages in the area have been built over the past years with funds and support from external sources such as the German aid agency GTZ, the French NGO Action Contre La Faim, the World Bank, the Asian Development Bank, and the European Commission (IR 2008b). These organizations have helped the villagers, especially the ones who were asked to resettle from upland areas in the past, through both infrastructure projects and livelihood assistance (IR 2008b). The NT1 project would force the recently resettled villagers, along with those who have long
been settled in the area, to move and abandon their villages where the foreign donors and organizations have invested. Relocation will also force these people to adapt to new locations and livelihoods irrespective of their previous houses and situations; the social-economic impact will be felt even more if some villages need to be resettled outside their traditional lands (IR 2008b). The NT1 project is located in an area with remarkable ethnic diversities and as such poses a threat especially to the livelihoods and cultural heritage of the indigenous people.

Communities in the area have for centuries relied on the Nam Tha River to support their livelihoods based on fishing, irrigation of dry-season crops, as well as for transportation between villages with trade activities in rice, agricultural produce and non-timber forest products (IR 2008b). In recent years there has been a trend toward increasing income opportunities resulting from the transporting of tourists between Luang Namtha and Pak Tha, which fits in with the attempts by many organizations and provincial agencies to raise the profile of the area as an ecotourism destination (IR 2008b). The impact on the livelihoods of these communities and the loss of revenues for the boatmen were obviously not taken into consideration as the project was planned. Moreover the criticism has been raised that the environmental and social impacts assessments prepared by GXED were presented to the local people in a biased way, omitting or downplaying some serious consequences that would result from the project. The affected people have been led to believe that the project will provide substantial benefits if it proceeds, and that there will not be any serious negative impacts (IR 2008b). It is clearly necessary for environmental and social safeguards to be established in a way that includes inputs from both project stakeholders and the public.
4.1.5 Results from the HSAP Analysis

For the NT1 project, the analysis is performed using the Early Stage tool from the HSAP because the project is currently back onto the planning stage due to the resettlement issues. The Early Stage tool is used for the purpose of identifying challenges of the project early on in order to improve the sustainability of the Chinese hydropower investments. There are nine topics in the Early Stage assessment, and a matrix was developed to draw conclusions based on the assessment of each of the topics using the HSAP guidelines as well as on evaluations of criticisms from third parties (See Appendix I, Table A).

Three areas – policy and plans, institutional capacity, and social issues and risks - are identified, based on the Early Stage analysis, as having the potential for significant negative impacts on the project; potential risks are indicated which may have greater impact as the project proceeds. With regard to policy and plans, the environmental and social-impact documents for NT1 were not released publicly as required by the National Hydropower Policy (NHP) of the Lao government. This exposes the lack of policy enforcement in Laos. Regarding institutional capacity, the institutions involved in this project are the (non-democratic) Lao government and the Chinese state-owned companies. A lack of transparency is identified as a consequence of the Lao government agencies having no incentives to push for public disclosure. In terms of the social risks, there is also a high potential for harmful socio-economic impacts due to the lack of significant public input. The research in this area indicates that only governmental officials and a small number of villagers were involved in the consultation, even though the project is located in an ethnically and culturally diverse area.
4.2 Nam Ngum 5 (NN5)

4.2.1 Location, Demographic and Economic Activity Description

The NN5 hydropower project currently under construction is located on the Nam Ting River, a main tributary of the Nam Ngum River in the Xieng Khouang and Luang Prabang provinces in northern part of Lao PDR (IR 2008b) (See Map 2). Downstream from the NN5, there are other dams in operation, under construction, or in a feasibility stage in the Nam Ngum watershed (See Map 1). The Nam Ngum River is the largest river in the Xieng Khouang province and, with a length of 1403 km; it is also one of the major tributaries of the Mekong River (WEPA 2012). Xieng Khouang province has a population close to 250,000 and a landscape characterized mainly by steep mountains; Luang Prabang province has a population over 400,000, including 12 distinct ethnic groups (LNTA 2008c). For the local villagers, fish is an important source of protein, and farming is a major part of rural land use in these provinces, with about 90-95% of agricultural land used for growing rice and other arable crops. Rain-fed production techniques are used on most cultivated land, while irrigated fields account for only a small proportion (PAD 2003).
4.2.2 Key Actors Involved

The financiers of the NN5 project include China Exim Bank, the Bank of China, Sinohydro and Electricite Du Laos. China Exim Bank is the official export credit agency of the Chinese government, Bank of China is one of the Chinese state-owned banks involved in dam construction overseas, and Sinohydro is a giant Chinese state-owned company that also invests in some projects it builds and has acted as both a developer and a builder of the NN5 project (McDonald et al. 2008). Electricite Du Laos is a state-owned corporation of Laos.

The regulatory agencies involved in the project are stated in the EIA report published by Sinohydro (Sinohydro 2008a):

“Key organizations and agencies involved in the IEE and EIA process include: the Government of Lao PDR (GoL); the Prime Minister’s Office (PMO); the Science Technology and
Environment Agency (STEA) which now is restructured and changed into the new authority namely “Water Resource and Environment Agency” (WREA); the Ministry of Agriculture and Forestry (MAF); the Water Resources Committee; the Ministry of Energy and Mines (MEM); the Environmental Management Unit of MEM’ Hydropower Department; the Ministry of Finance; the Department of Land Development and Planning which is under the National Land Management Agency, Prime Minister Office; the Ministry of Education; the Provincial and District Governor(s) Offices of the project location. Measures for monitoring and managing potential environmental and socio-economic impacts have been developed based on Lao PDR legislation, regulations, decrees, standards and guidelines.”

The Water Resources and Environment Administration (WREA) of the Lao government has a department devoted specifically to the review of the environmental and social impacts of hydropower projects (Campbell 2011). Other third parties, including NGOs such as International Rivers and other public interest groups, have expressed strong criticism of the NN5 project.

4.2.3 Technical Specifications, Financing and Timeline

NN5 is a 104.5-meter-high dam with a total installed capacity of 120 MW, and its reservoir is estimated to cover an area of 15 km$^2$ (IR 2008b). The project is being developed by the Nam Ngum 5 Power Company, which is a joint venture company between Sinohydro as an 85% stakeholder, and Electricite du Laos (EDL) as a 15% stakeholder (IR 2011). The approximately US $200 million estimated costs of the project come primarily from the Bank of China (US $140 million), with additional funding from Sinohydro (US $54 million) and EDL (US $6 million) (Adams & Ryder 2008). Furthermore, the investment guarantee agency of the World Bank -- the Multilateral Investment Guarantee Agency (MIGA) -- provides protection against political risk for the project (IR 2008b). There are also publications indicating that the China Exim Bank will provide some funding for the NN5 project (Li 2010; McDonald et al. 2008). NN5 is being developed under the BOT model, meaning that the Nam Ngum 5 Power Company will build and operate it over a 25-year concession period, after which the ownership of the NN5 will be transferred to the Lao government.
International Rivers (IR), a NGO that was established in 1985 to protect the world’s rivers from destructive dams and to advocate for the rights of dam-affected communities, has raised some concerns about the NN5 project. According to IR, the construction of the project by Sinohydro reportedly began in April 2008, earlier than the stated date of July 9, 2008 on the Project Design Document (PDD) of NN5. The Environmental Impact Assessment (EIA) was approved by the Water Resource and Environmental Administration (WREA) of Lao in June 2008 (IR 2008b). The approval of the Social and Environmental Obligations of the company was granted by WREA in July 2009 (IR 2010). As of June 2011, the NN5 project was 60% complete and the expected completion date is April 2012 (IR 2011). Furthermore, the environmental and social documents – the EIA, the Environmental Management Plan (EMP), and the Social Action Plan (SAP) -- were prepared by the Dongsay Company, a consulting firm, and the final versions of these documents were published in June 2008 (Sinohydro 2008b). The start of the NN5 project prior to the final approval of the EIA could potentially undermine the EIA’s assessments and alternative options.

4.2.4 Environmental Impact and Socio-Economic Assessment by Sinohydro

The final version of the EIA report was published by Sinohydro on June, 2008. The document provides the general background information of the NN5 project, the technical descriptions, project implementation schedule, cost and, more importantly for purposes here, the assessment on environmental and socio-economic impacts and mitigation measures. The environmental and socio-economic impacts were assessed regarding the dam location and the periods of construction and operation. In terms of the environmental impacts due to the dam location, the report indicated the wildlife and/or wildlife habitat loss would not be significant within the project area because the forest and forest land area have already been destroyed due to
activities such as logging, slash-and-burn for cultivation purposes and bombing during the Indochina War (Sinohydro 2008a). The environmental impacts on the aquatic system, wildlife and wildlife habitats during the construction period were found to be insignificant. Furthermore, the impacts during the dam operation period were expected to be insignificant with respect to fish species diversity and fish population as well as wildlife. Moreover, the sediment deposition of dam operation was deemed to be minor and its impact on the downstream water quality to be insignificant (Sinohydro 2008a). In terms of the socio-economic impacts, the report indicated a moderate impact amounting to a loss of some 54 hectares of rice paddy fields and a loss of around 9 fishponds due to the dam location, as well as a closing of an existing access road and a bridge (Sinohydro 2008a). Other socio-economic impacts during the construction and operation periods were said either to have no impact or to be beneficial to the local communities in terms of employment opportunities, improved power supply, and improved fishery opportunities and water-way access (Sinohydro 2008a).

4.2.5 Criticisms on the Potential Environmental and Socio-Economic Impacts

China plays the roles of financier, developer and builder in its involvement in the NN5, obviously enabling it to have a strong influence on the project. Despite evidence that Sinohydro has been taking the EIA more seriously in recent years (IR 2012d), there is still much controversy surrounding the quality of the assessment done for NN5. In terms of environmental impacts, IR points out several gaps that appear on the EIA report posted on MIGA’s website, suggesting the possibility that the potential impacts of the project are being seriously underestimated. The final version of the EIA report, published in 2008, has been compared with the 2007 version that IR examined, and the following criticisms made by International Rivers still appear to demand consideration. First, the EIA does not include baseline data for the aquatic
resources and fisheries assessments, and therefore, the conclusion that there will not be any significant impact on aquatic habitats is not valid (IR 2008b). Second, the EIA concluded that the project will only generate a minimal disturbance on wildlife and wildlife habitats, since the construction site is small, but there was no data provided to support this assertion (IR 2008b). Third, the EIA regards all identified potential impacts on wildlife, wildlife habitats, aquatic habitats and water quality as insignificant but does not provide any indication as to how this conclusion was drawn (IR 2008b).

Without addressing these issues that IR has raised, the EIA report for NN5 must be regarded as incomplete. In particular, the impact on fisheries has been one of the main concerns for many environmental groups because, as already noted, the Mekong River and its tributaries provide habitat for more than 1500 species of fish (WWF 2012b). Hydropower undoubtedly has significant value in developing the country and in being a source of funds for the Lao government. However, without properly assessing the impacts of dams on the fisheries, it can cause a major loss of biodiversity in the Mekong River and its tributaries. While there are other hydropower dams operating and projects under construction downstream from the NN5, the harmful impacts on fisheries and aquatic diversity will certainly increase as more dams are being built on the same watershed. Since the current EIA approach is on a project-by-project basis, without consideration of downstream effects and cumulative impacts (Schouten 1998), it is likely that the impact of NN5 on the fisheries is being significantly underestimated. Establishing a baseline through water quality monitoring and modeling, as well as surveying and monitoring of fisheries, is necessary for the development of appropriate mitigation measures (Schouten 1998).
International Rivers also points out that the SAP report lacks sufficient assessments of alternative approaches or of compensation plans for the affected communities. As stated in the report published by International Rivers (IR 2008b):

“The SAP asserts that only 50ha of rice paddy used by 49 families will be flooded. Due to limited availability of suitable paddy land, the SAP recommends providing compensation in the form of cattle, buffalo and ‘wire fencing.’ Cash crop plantations are also recommended. There is no assessment of available land for cash crop production or livestock grazing, the accessibility of markets, or villagers’ experiences with these types of activities. It is also not clear how villagers would provide rice for their families beyond the five years of rice support offered by the project.”

In addition, there is no assessment of how the NN5 project will affect the critical sources of income activities, both with respect to fishing and non-timber forest products, for the affected communities (IR 2008b). Consequently, the socio-economic cost associated with potential losses for fisheries and non-timber forest products are not taken into account. The criticisms raised against the EIA and the SPA by IR strongly suggest that the actual environmental and socio-economic impacts of the NN5 can be greater than what the reports indicate. A more rigorous analysis of these critical issues is needed before mitigation strategies for both the environmental and socio-economic impacts of NN5 can be developed.

4.2.6 Results from the HSAP Analysis

For the NN5 project, the analysis was performed using the HSAP Preparation Stage tool, since the project is currently under construction; the intent is to evaluate the practices of the Chinese companies and to determine what aspects could be improved before implementation of the project. There are twenty-three topics in the Preparation Stage assessment, and a matrix was developed to form conclusions based on an assessment of each of the topics using the HSAP guidelines, as well as on an evaluation of criticisms from third parties (See Appendix I, Table B).
A score is assigned to each of the topics for the purpose of a relative comparison of how each of the topic stands against "basic good practices."

Through the analysis, four areas are identified as having significant negative impacts on the development of the project. These areas include communication and consultation, governance, environmental and social impact assessment and management, as well as economic viability. In terms of the communication and consultation perspective, the analysis indicates that the current communication framework of the project seems to be designed mainly for engaging the stakeholders of the company and provincial/district agencies, and there is a lack of input from the local communities. From the governance perspective, a more transparent disclosure of information is needed since there is a lack of transparency regarding Sinohydro, and the government agencies in Laos have little if any incentive to push for public disclosure. Regarding the environmental and social impact assessments, there is a lack of comprehensive and stringent assessments. The research indicates furthermore that there is no comprehensive cost-benefit analysis that incorporates economic, social and environmental considerations to accurately determine the net economic gain of the NN5 project.

5. Conclusion and Recommendations

The Mekong region is one of the most complex and diverse areas of the world in terms of both its ecology and its ethnic composition, and as such presents a high-priority concern for the World Wildlife Fund and other organizations concerned with environmental and energy policies. Dams have for many years been a major source of electrical power in the region, and are becoming increasingly vital to its rapidly growing economies. However, dam development can also have harmful social and environmental consequences. The objectives of this project were to identify major impediments to reducing the negative environmental and socio-economic impacts
associated with Chinese-built hydropower dams in the Mekong, and to suggest ways in which the World Wildlife Fund (WWF) might act to weaken some of the major impediments.

Two of the Chinese-built hydropower dams, NT1 and the NN5, have been studied through the use of the HSAP. For the NT1 project, the analysis of the Early Stage using the HSAP suggests that there are areas of the project where potential risks are indicated. These risks may have greater impact as the project proceeds due to the lack of policy enforcement in Laos, a lack of transparency in disclosing information, and insufficient public input. The NT1 project therefore has a high potential for harmful socio-economic impacts, especially in light of its location at an ethnically and culturally diverse area. As a result, the Lao Energy and Mines Ministry in February, 2011 announced a halt to the NT1 project until further studies could be conducted. For the NN5 at the preparation stage, the HSAP analysis indicates that the current communication framework of the project lacks input from the local communities. It is crucial to have a significant degree of direct engagement and input from local communities, especially from the directly affected communities, to ensure a comprehensive management plan for reducing the potential for harmful environmental and social impacts. Along with public participation, a more transparent disclosure of information and an integrated project management approach are needed throughout the environmental and socio-economic impact assessment. Furthermore, the net economic gain of the NN5 project cannot be accurately determined by the Chinese companies and financiers without a comprehensive cost-benefit analysis that incorporates economic, social and environmental considerations. Analysis of the two case studies suggests that two key impediments to reducing negative environmental and social-economic impacts are insufficient public engagement and a lack of transparency.
This report will conclude by suggesting ways in which NGOs such as the World Wildlife Fund might act to weaken the major impediments to the reduction of the negative environmental and socio-economic impacts associated with Chinese hydropower investments in the Mekong. One of the impediments has been the undemocratic nature of the Chinese and Laotian governments, which has discouraged meaningful involvement of communities directly affected by hydropower dam development. In order to enhance public engagement, WWF and other NGOs should highlight the business risks in their engagement with Chinese financiers and developers. One of the business risks, for example, is that the Lao government could stop a project if there is a major resettlement issue, as in the NT1 project. The recent public outcry in Burma over a planned Chinese hydropower project, which led to the Burmese government's rejection of the project in order to "respect the people's will," (Washington Post 2011) further suggests that communities affected by dam projects in the Mekong may finally be having some influence on how these projects are being planned. More generally it appears that in recent years there has been increasing attention paid to the effects of hydropower projects on the local populations in addition to the impacts on the environment, and to the risks faced by these populations in addition to those faced by investors. This provides NGOs with greater leverage in advocating that the Chinese give more consideration to the environmental and socio-economic implications of their overseas hydropower projects. In addition, the Chinese companies and financiers can also benefit from the adoption of better practices which can not only result in sounder investments, but can also lower the risk of damaging their reputations.

Another impediment to better environmental practices in dam development in the Mekong has been the lack of transparency and the reliance on feasibility studies carried out by developers who obviously have a vested interest in emphasizing the beneficial aspects of hydropower
projects while downplaying some of the very real negative environmental and socio-economic consequences reviewed in this report. This lack of transparency, and the reliance on the feasibility and environmental impacts studies carried out by the developers themselves, has been criticized by International Rivers, for example, but there do not appear to be many specific recommendations as to how to encourage transparency and unbiased feasibility and environmental impact studies. One recommendation for improving the situation is to require that these studies be carried out by independent, third-party organizations. This has also been recommended in a recent publication in which it is suggested that such a third party might be an independent institute with a specific mandate to protect the public interest (Foran et al. 2010).

Greater transparency should also be demanded of project development plans at both regional and country levels in order to accurately forecast hydropower needs not only within Laos but also in the neighboring countries served by the Laotian dams. Here again there has been reliance on general forecasts of electric power needs by utility sectors that would benefit from overestimates of these needs. Estimates by third parties of future hydropower needs in the region would be more credible.
## Appendix

### Table A - HSAP ES - Early Stage (Nam Tha 1)

| Topics                  | Assessments of HSAP                                                                                                                                                                                                 | Criticisms from Third Parties                                                                                                                                                                                                 | Conclusions/Recommendations                                                                                                                                 |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ES-1 Demonstrated Need  | According to a World Bank report, the domestic electricity consumption in Laos was 1,578 GWh in 2008, and it is projected to grow at a rate of 10% annually; additionally, the electrification of households in Laos has already reached the target of 70% by the end of year 2009, and the future plans of the Lao government are to reach 80% by 2015, 90% by 2020. Moreover, high voltage transmission lines to promote power trading within the Greater Mekong Sub-region (GMS) countries are being planned, and the demand for hydropower export from Laos to neighboring countries is growing. Nam Tha 1 (NT1) is part of the National Hydropower Project. The need for water service of NT1 was not identified. | Criticism relating specifically to the need for the NT1 project was not identified. However, there is criticism of the overall electricity sector planning in the Mekong Region regarding hydropower development. This includes objections that the planning of hydropower projects is based on uncertain projections of high demand for electricity in China, Thailand and Vietnam. Such projections are made by the energy utility sector, and its vested interest as well as the lack of a transparent Power Development Plan (PDP) can result in an over-estimation of the forecasted demand. This over-estimation favors large-capital projects that can translate into higher cost to consumers. | A more transparent PDP on both the regional and country levels is needed in order to accurately forecast the domestic demand in Laos, as well as the demand for hydropower generation exported from Laos to neighboring countries. |
| ES-2 Options Assessment | Alternative options for meeting energy and water needs in the region were not identified, nor were alternative considerations found regarding the siting and design of NT1.                                                                雅斯 | No criticisms were found regarding this aspect.                                                                                                                                                                                                                                           | An early-stage analysis of different options available regarding NT1’s siting and design could greatly reduce the environmental and socio-economic impacts of the project, as well as reduce the risk to the dam developer. Alternative options for meeting energy and water needs in the region are also needed to fully justify the development of NT1 as a high-priority option. |
| ES-3 Policies & Plans   | The National Hydropower Policy (NHP) of Laos, enacted in 2005, can be considered the most relevant policy because it requires a full EIA report, an EMP and Resettlement/Social Development plan for all large hydropower projects (installed capacity of 50 MW or more and inundating 10,000 ha or more). | The NHP has been considered ineffective on several counts, including weak political commitment and a lack of both human and financial resources. International Rivers has raised the criticism that the NT1 project has violated the NHP as a result of the construction of the dam, and the lack of stringent implementation of a national policy such as the NHP is indicative of the shortfall in proper regulations in Laos. As a result, the EIA and other environmental and social-impact documents were not released publicly as | The lack of stringent implementation of a national policy such as the NHP is indicative of the shortfall in proper regulations in Laos. As a result, the EIA and other environmental and social-impact documents were not released publicly as |

---

1 The GSM includes countries of Burma, Laos, Cambodia, Thailand, Vietnam and Yunnan Province, China.
more), as well as the public disclosure of documents on impact assessments, consultation and mitigation plans, and monitoring reports.\(^6\)\(^7\) an access road prior to a full report on environmental and socio impacts.\(^9\) required by the NHP, and the construction of an access road was begun before the completion of the required assessments. The responsibility to take measures to comply with the stated policy is largely left to the developer.

**ES-4 Political Risks**

| NT1 is located in Lao PDR, a single-party, nominally Marxist-Leninist state ruled by the Lao People’s Revolutionary Party (LPRP).\(^10\) No major political risks were found at this time in Lao PDR. Regionally, Burma has been taking steps toward more democratization in recent years, although the political situation remains unsettled.\(^11\) | No criticisms were identified from the third parties regarding this aspect. | Burma in recent years seems to be less settled politically compared with the other GMS countries, and this may pose further uncertainty for the stability of the region. Overall, the potential political risks for the NT1 project in Lao PDR seem to be low at this time. |

**ES-5 Institutional Capacity**

| The institutions most relevant to the NT1 project are the China Southern Power Grid (CSPG), a Chinese provincial-level, state-owned enterprise as the main stakeholder, and Electricite Du Laos, a minor stakeholder in the project. Financing is largely coming from the CSPG. Other key institutions involved include the Guangxi Electric Power Industry (GXED), a Chinese state-owned enterprise that designs and develops the NT1 project, and the Water Resources and Environment Administration (WREA) of the Lao government that reviews the impacts of the project. Other agencies within the Lao government, such as the Ministry of Energy and Mines (MEM) and the Ministry of Agriculture and Forest (MAF), are also likely to influence the development and operation of the NT1 project. | The lack of transparency in decision-making, the lack of public involvement especially within the affected communities, and the absence of sufficient enforcement of the environmental laws in Laos under an undemocratic political structure, are all being criticized as impediments to the mitigation of negative impacts of hydropower projects on the affected populations and on Laos overall.\(^9\) | Institutions that play major roles in the NT1 project are government agencies and state-owned entities on which there is very little pressure to disclose information as to their internal operations. There is no obvious evidence for any decision-making by these institutions that includes the full range of stakeholders. The institutions involved in the development and operation of the NT1 project appear to lack transparency and the motivation or the capability to involve a range of stakeholders in any comprehensive and balanced dialog. |

**ES-6 Technical Issues & Risks**

| No evidence has shown that any technical issues/risks were being identified or taken into account. | Technical issues relate to the turbidity of the Nam Tha during the rainy season were identified in a report done by a Canadian consulting group in the 1990s.\(^12\) | There appears to be no indication that the Chinese developer has addressed the possible technical issues relate to the 1990s' findings. Identifying any technical issues required by the NHP, and the construction of an access road was begun before the completion of the required assessments. The responsibility to take measures to comply with the stated policy is largely left to the developer. |

---


<table>
<thead>
<tr>
<th>ES-7 Social Issues &amp; Risks</th>
<th>NT1’s dam location and its reservoir are expected to affect parts of both Bokeo Province and Luang Namtha Province. Bokeo Province is home to a large number of ethnic minorities and more than 400 villages. Luang Namtha Province is well known for its ethnic diversity and indigenous cultures, and is home to more than 20 different ethnic groups. Much of the infrastructure in the villages that are at risk from possible flooding associated with the dam development was built up with funds and support from external sources such as the German aid agency GTZ, the French NGO Action Contre La Faim, the World Bank, the Asian Development Bank, and the European Commission. News reports have also mentioned that some historical sites would be adversely affected.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IR has estimated that the project would require the resettlement of almost 8,000 people from 1,379 households in 34 villages, most of them being ethnic minorities. Resettlement would also be required for as many as 4,600 people in 16 villages downstream from the dam. Some villagers who have already been recently resettled would be forced to move from areas where foreign donors and organizations have previously invested. This relocation would force those affected to not only adapt to new locations but also to find new livelihoods, and the social-economic impact will be felt especially among those needing to be moved far from traditional lands. Furthermore, local consultation groups have been criticized for involving only government officials and a small portion of villagers, and for taking a biased approach based on the benefits of the dam as presented by the company preparing the assessments.</td>
</tr>
<tr>
<td></td>
<td>The NT1 project raises serious and complex social issues involving many diverse and indigenous cultures; the loss of cultural heritage and historical sites must certainly be counted among the negative impacts. The social-economic impact of the NT1 is high especially with regard to the resettlement it would require. A much more rigorous and objective assessment, with involvement and input from the local communities, government, and third parties including perhaps international organizations, is necessary to minimize the negative socio-economic impacts. At the same time this would serve to reduce financial risks to the project's investors and developers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ES-8 Environmental Issues &amp; Risks</th>
<th>The NT1 project is located on the confluence with the Mekong River, and as such poses major threats to the aquatic biodiversity of the Mekong River, a unique habitat for so many fish species. These threats include the disruption of fish migratory patterns, reduction in water quality, and interruption of the natural sediment movement that serves to replenish the nutrients that are vital to the diversity and productivity of aquatic species. According to the World Bank, biodiversity loss and the changing ecological balance are some of the environmental impacts have direct consequences for the local communities whose social and economic well-being is heavily dependent on the fisheries.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>International Rivers points out the EIA report failed to address impacts on water quality and living aquatic resources, and that the impacts on forest and wildlife are hardly mentioned at all.</td>
</tr>
<tr>
<td></td>
<td>The major environmental issues and risks directly associated with the NT1 project are its impact on aquatic life and fisheries along the Mekong River, which hosts more than 1500 species of fish and supplies about 80 percent of the protein in the diet of the people of the lower Mekong. These environmental impacts have direct consequences for the local communities whose social and economic well-being is heavily dependent on the fisheries.</td>
</tr>
</tbody>
</table>

---

| ES-9 Economic & Financial Issues & Risks | The financial risk associated with NT1 is not immediately obvious, as the financing is backed by Chinese stakeholders with substantial capital and experience with dam projects in the region. More apparent are the economic risks related to the potentially excessive social and environmental costs associated with the resettlement of large populations and the compensation for the loss of fisheries and agriculture land supporting the livelihoods of local communities. It does not appear that any early-stage cost-benefit analyses have been reported regarding the financial and economic risks of the NT1 project. | The NT1 project was first considered in the early 1990s, but was regarded as a low priority due to projected high costs and low potential returns on investment. There has been criticism from International Rivers that the compensation packages proposed for affected villagers do not reflect the actual anticipated losses. The potential of excess social and environmental costs are the most obvious risks needed to be considered for the NT1 project. Cost under-estimation will likely result in inadequate compensation for the affected villagers, which will further increase the socio-economic impact on the local communities. An early-stage cost-benefit analysis will better inform the financier and developers as to the net economic benefit they can expect from the project. |

---


<table>
<thead>
<tr>
<th>Topics</th>
<th>Assessments of HSAP (Including the third party criticisms)</th>
<th>Scoring</th>
<th>Conclusions/Recommendations</th>
</tr>
</thead>
</table>
| P-1 Communication & Consultation | Based on the NN5’s social action plan (SAP), environmental management plan (EMP), and environmental and social monthly progress report (E&S monthly progress report), there is a list of various stakeholder’s responsibilities; however, no comprehensive analysis has been found regarding their specific rights and risks. The grievance procedure is rather simple, and there is no evidence of variation on approaches for different stakeholder groups and issues. There is no strong evidence found for a comprehensive stakeholder engagement at the preparation stage. A reporting program exists as an ongoing process in place for limited stakeholders, mainly comprising teams and units set up by the developer, to examine the progress and raise any concerns. Lastly, there is no major non-compliance identified.  

1 point – There are significant gaps relative to basic good practice.                                                                                                       | For the NN5 project, the communication framework seems to be designed mainly for engaging the stakeholders of the company and provincial/district agencies, which may have some social components. However, it is crucial to have a significant amount of direct engagement and input from local communities, especially from the directly affected communities. A more comprehensive analysis on each stakeholder’s rights and risks is also needed to enhance the communication and consultation strategies. |

---

<table>
<thead>
<tr>
<th>P-3 Demonstrated Need &amp; Strategic Fit</th>
<th>The Clean Development Mechanism Project Design Document (CDM-PDD) of the UNFCCC, as well as the EIA report and EMP prepared by Sinohydro and the Dongsay Company, make some statements on the needs and benefits of the NG5’s development, but the descriptions are broad and general in nature. In the EIA report, it is stated that the NN5 project can meet Lao PDR’s regional electricity demand as reported in a pre-visibility study and preliminary review of environmental issues by a German corporation in collaboration with an Australia corporation. However, the details of the study are not explained. In addition, International Rivers has criticized the CDM-PDD report especially regarding gaps in its analysis and what IR regards as an overestimation of potential benefits.</th>
<th>2 points – Most relevant elements of basic good practice have been undertaken, but there is a significant gap.</th>
<th>A more transparent disclosure of information regarding the power planning and the need for the project are needed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-4 Siting &amp; Design</td>
<td>According to the project alternatives section in the EIA report, the NN5 project design was chosen out of the five alternatives assessed during the pre-feasibility study. The selection of the dam site is also explained in the report; however, it only included environmental and technical considerations.</td>
<td>1 point – There are significant gaps relative to basic good practice.</td>
<td>The siting and design of the project would be better addressed if it included some detailed analysis as well as more comprehensive data in the documents. Also, for completeness the siting of the project should incorporate economic, financial, as well as social considerations.</td>
</tr>
<tr>
<td>P-5 Environmental &amp; Social Impact Assessment &amp; Mgmt</td>
<td>Assessments on environmental and social impacts, as well as some mitigation strategies are presented in the EIA, SAP, as well as the CDM-PDD report. The EMP report further shows the management plans and mitigation processes for reducing negative impacts. However, the EIA has been criticized by International Rivers for having no baseline data for aquatic resources and fisheries assessment, no strong evidence on the minimal impact on wildlife and its habitats, and minimal explanations on some of the impacts identified as insignificant. The SAP has also been criticized for its lack of sufficient assessment of alternative approaches or of compensation plans for the affected communities. The potential cumulative impact of the NN5 and other hydropower dams is especially important and should be carefully addressed and studied.</td>
<td>2 points – Most relevant elements of basic good practice have been undertaken, but there are significant gaps.</td>
<td>More comprehensive and stringent assessments of environmental and social impacts, as well as better planning with inputs from various stakeholders are needed. The potential cumulative impacts of the NN5 and other hydropower dams are especially important and should be carefully addressed and studied.</td>
</tr>
</tbody>
</table>

---

| P-6 Integrated Project Management | The EMP indicates various management plans in the report including mitigation and monitoring plans for the construction and operation phases, various environmental, health, and safety aspects, and technical considerations relating to the reservoir clearance and filling plan. There is also an estimated budget for various topics addressed in the environmental and social management plan. However, there is no analysis of construction risks and no discussion of processes for managing such risks. 

2 points – Most relevant elements of basic good practice have been undertaken, but there is a significant gap. | The integrated project management can be improved by incorporating an analysis of construction risks as well as processes for managing these risks. |
|---|---|---|
| P-7 Hydrological Resource | It is evident that an assessment of the hydrological resource has been performed; however, based on the information in the EMP report, it is not clear what data, tools and methods were used. The report stated that “the storage upstream intake is 30 to 65 Mm³, more than enough to accommodate the expected siltation over 50 years of project economic life.” However, given the possible impacts that may affect the water availability under different possible scenarios, there is insufficient presentation of risks and uncertainties. 

2 points – Most relevant elements of basic good practice have been undertaken, but there is a significant gap. | The developer of the project should take into account the possible impacts that may affect water availability under different possible scenarios. The uncertainties and risks to both long- and short-term water supply must be addressed. |
| P-8 Infrastructure Safety | The EMP report indicates that a Health and Safety Plan has been undertaken for workers during the construction phase, an alert procedure will be incorporated into the safety operation guidelines, and the safety of the site access roads have also been considered. However, the plan and procedures are not presented in very much detail in the report. Assessment specifically regarding the dam structure was not found. 

1 point – There are significant gaps relative to basic good practice. | It is uncertain to what extent the dam itself has been properly assessed regarding infrastructure safety issues. Although there are some plans and procedures prepared regarding infrastructure safety, they cannot be adequately assessed due to the lack of detailed information in the report. |
| P-9 Financial Viability | The estimated cost of the NN5 project is approximately US $200 million, and the financing comes primarily from the Bank of China (US $140 million), with additional funding from | Financial information and data for hydropower projects in the Mekong are difficult to find since they are typically not publicly disclosed. However, the social |
Sinohydro (US $54 million) and EDL (US $6 million). Whether proper risk assessment, scenario testing and sensitivity analyses have been done regarding the financing for these institutions is unclear due to the lack of access to detailed information. However, the funding for the project seems to have no major risk because the Chinese state-owned Sinohydro and Bank of China are financially stable currently. Although data as to revenue streams and expected financial returns of the NN5 project were not found, a recent comprehensive study shows that typical financial returns for large hydropower projects in the Mekong can be expected to be around 12-14% before inflation.

| P-10 Project Benefits | The CDM-PDD report states the following benefits of the NN5 project: “The construction and operation of the proposed project will increase government revenue through tax, and stimulate the economic development of local area,” as well as, “the construction and operation of the proposed project will create more job opportunities for local people. Rural labors could be arranged for on-site construction during the construction period, and some long-term job opportunities could be offered during the operation period.” The EIA also lists some benefits that will contribute to the local community development programs, such as electrification of the rural area, improved waterway access and better health and education facilities, to name a few. However, no pre-project baseline is shown to compare against the stated benefits, and no sharing strategies/plans are presented. | 1 point – There are significant gaps relative to basic good practice. | Various benefits are presented in the report, including one-time compensation payments for the affected communities. The various stated benefits should be compared to a pre-project baseline, and benefit sharing strategies and plans should be established in order to maximize the benefits to the affected communities. A report published by the EU Water Initiative’s SPLASH project stated the following: “Without benefit sharing, projects become more difficult to justify to society because of their cumulative environmental and social impacts, and the inequitable distribution of those impacts.”

| P-11 Economic Viability | There are some costs of the project identified in the EIA report and some benefits as well; however, no comprehensive cost-benefit analysis. | 1 point – There are significant gaps relative to basic good practice. | A comprehensive cost-benefit analysis that incorporates economic, social and environmental considerations is needed in

---


A procurement plan has been undertaken, no detailed information regarding supply sources, supply chain risks, corruption risks, etc. is presented. A more transparent procurement plan is therefore needed.

A more stringent assessment about the affected local communities and their livelihoods is needed, and a more comprehensive action plan with input from various stakeholders, especially the affected communities, is also necessary.

A socio-economic baseline for resettlement is necessary in order to accurately assess the impacts to the local communities and to determine adequate and proper compensation for them.

An assessment regarding the impact on the indigenous people needs to be undertaken to fully determine whether there will in fact be any impact.

It appears that basic good practices are followed in this regard.

---

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Score</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-17 Cultural Heritage</td>
<td>According to the EIA, some surveys and personal interviews with the villagers had been done, and there was no cultural heritage loss identified for the NN5 project.</td>
<td>Not scored. Unable to verify enough objective evidence to support a score.</td>
<td>Although the EIA claims that there will be no impact on cultural heritage, there is no detailed information on the survey and interviews done. It is therefore difficult to judge the depth and extent to which the assessment was actually carried out.</td>
</tr>
<tr>
<td>P-18 Public Health</td>
<td>The public health plans and processes are being addressed in the EMP and EIA reports. There are no major criticisms or obvious gaps found in this regard.</td>
<td>3 points – Basic good practices are met.</td>
<td>It appears that basic good practices are followed in this regard.</td>
</tr>
<tr>
<td>P-19 Biodiversity &amp; Invasive Species</td>
<td>An assessment of terrestrial as well as aquatic biodiversity has been undertaken. However, the project’s EIA has been criticized for not including baseline data for the aquatic resources and fisheries assessments.</td>
<td>2 points – Most relevant elements of basic good practice have been undertaken, but there is a significant gap.</td>
<td>The baseline data are important for an objective and more accurate assessment of the impacts on biodiversity, and such data should be included in the EIA.</td>
</tr>
<tr>
<td>P-20 Erosion &amp; Sedimentation</td>
<td>Erosion and sedimentation issues are discussed in both the EIA and EMP reports, together with control measures. However, no detailed information on sediment load and its impact on the river system are presented in these reports.</td>
<td>2 points – Most relevant elements of basic good practice have been undertaken, but there is a significant gap.</td>
<td>More detailed information is needed in order to understand the impact of erosion and sedimentation on the river system.</td>
</tr>
<tr>
<td>P-21 Water Quality</td>
<td>In the EIA report, the water quality issue is addressed for both the construction and operation phases. The potential impact, mitigating measures and the responsible agency are briefly addressed. Monitoring of water quality will be done by the responsible contractor and company.</td>
<td>3 points – Basic good practices are met.</td>
<td>Although basic good practices seem to be met, there are still opportunities for improvement. For instance, the cumulative impact on water quality of several dams in the same basin should be further explored in order to understand the real impact of NN5 on water quality.</td>
</tr>
<tr>
<td>P-22 Reservoir Planning</td>
<td>The Reservoir Clearance and Filling Plan section is incorporated in the EMP in a fair amount of detail. The objective, the required result, and the implementation approach are all addressed in the plan.</td>
<td>3 points – Basic good practices are met.</td>
<td>It appears that basic good practices are followed in this regard.</td>
</tr>
<tr>
<td>P-23 Downstream Flow Regimes</td>
<td>There is no evidence that a proper assessment was done on downstream flow regimes. No detailed information was found in this regard.</td>
<td>1 point – There are significant gaps relative to basic good practice.</td>
<td>A proper assessment of downstream flow regimes and their environmental, social and economic effects is needed in order to avoid, as much as possible, unforeseen negative impacts.</td>
</tr>
</tbody>
</table>
References


