SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF REHABILITATION OF THE NATIONAL ROAD 13N: A CASE STUDY FROM XAI DISTRICT TO NAMO DISTRICT, OUDOMXAI PROVINCE, LAO PDR

CHANPHENG MANIVANH

MASTER OF SCIENCE

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2010

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Thesis Title	Socio-economic and Environmental Impacts of Rehabilitation of the National Road 13N: A Case Study from Xai District to Namo District, Oudomxai Province, Lao PDR
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ABSTRACT

This study aims to: (1) To determine and quantify the impacts of rehabilitation of the National Road 13 N on socioeconomic and environmental components in Xai and Namo Districts, Oudomxai Province; (2) To develop options for mitigation measures and compensation packages to offset the impacts; (3) To involve the communities in selecting acceptable mitigation measures; (4) To calculate the costs of the social compensation and environmental mitigation package selected and acceptable by the communities to offset project externalities and (5) To calculate the real costs of the rehabilitation road project to the Lao people by internalizing the social and environmental costs of the project. Hence, this paper identifies the positive and negative impacts on the physical environment and socio-economic aspects of project-affected-persons (PAPs) from rehabilitation of the National Road 13 N. This study thus satisfies all the goals of the EIA Regulation, No. 1770/STEA, October 2000. The term "Environment" is expanded to integrate human wellbeing and livelihood together with physical natural resources; thus the current EIA evaluates the project's effects in terms of land use, environmental changes, method uses data management and data mapping by interviewing from questionnaires and reviewing secondary data and primary data between the EIA feasibility studies of rehabilitation of the National Road Projects from relevant jurisdictions and the developed EIA "best practice" guidelines from other countries. It is validated by experts from these jurisdictions. A complete

and quality of life. Public participation is a part of the EIA process according to the Lao EIA regulations for articulating project information to affected residents (PAPs) and to receive their feedback, concerns and opinions on valued environmental components. Guideline development EIA is recommended for further study and as a capacity building tool for government staff from the Provincial Department of Roads and to verify actual impacts and evaluate details of the socio-economic and environmental impact costs of rehabilitation road projects. The analysis of impacts of rehabilitating the National Road 13N through the Xai and Namo Districts found that approximately US$ 1,700,000 of socio-economic and environmental costs were imposed upon these districts by the construction works. This is equivalent to about $88 per person for the 19,195 persons living along the 78 kms stretch of road (or about 13.5% of their GDP). The costs of mitigation and compensating all project-affected-persons amounted to only 4 percent of total road construction costs…… not a large amount of additional monies to have included in the road contract for the costs of social equity and environmental protection and preservation. The total imposed costs of 4% of total road costs is on the low side of the range referenced in the technical literature (1-7 percent of total costs). However, no amount of funds was estimated for environmental supervision or management by the contractor and/or the project proponent and no estimate was included also for monitoring costs to verify that implemented mitigation measures were adequate and satisfactory.

Keywords: Lao PDR / Socio-economic / Environmental Impacts / National Road Project / Compensation and Mitigation Measures.

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LIST OF ABBREVIATIONS

ADB	: Asia Development Bank
APs	: All affected persons
CSC	: Construction Supervision Consultant
DOH	: Department of Highways
DIZ	: Direct Impact Zone
DPRA	: Development Project Responsible Agency
DPs	: Displaced persons
ESRS	: Environmental and Social Responsible Staff
ESD	: Environmental and Social Division
EIA	: Environnemental Impact Assessment
EMP	: Environnemental Management Plan
GOs	: Government Organizations
GMS	: Greater Mekong Subregion
GDP	: Gross Domestic Product
HH	: Households
INDIZ	: In Direct Impact Zone
KI	: Key Informants
Lao PDR	: Lao People's Democratic Republic
MPWT	: Ministry of Public Works and Transport
MCTPC	: Ministry of Communication, Transport, Post, and Construction
NTFP	: Non-timber forest products
NR	: National Road
NGD	: National Geographic Development
ODPWT	: Oudomxai Department of Public Works and Transport
OSTEA	: Oudomxai Science, Technology and Environmental Agency

ODPI	: Oudomxai Department for Planning and Investment
PRC	: People's Republic of China
PRA	: Participatory Rural Appraisal
RRA	: Rapid Rural Appraisal
RNR	: Rehabilitation of the National Road
RAP	: Resettlement Action Plan
SIA	: Social Impact Assessment
SPSS	: Statistical Package for the Social Sciences
UNESCAP	: United Nations Economic and Social Commission for Asia and the Pacific
WREA	: Water Resources and Environmental Administrative
WB	: World Bank

DEFINITIONS

Environmental Resource (ER): An aspect of the environment which is of benefit to man, including all ecological resources and values.

Environmental Impact (EI): An impact on environmental resources or value resulting from natural or man-made actions, including project development (measured by physical, chemical and biological parameters)

Affected Persons (APs): per Decree No. 192 on Compensation and Resettlement of People Affected by Development Projects, any person or entity or organization affected by a project, who in the context of acquisition of assets or change in land use before the project commencement date, would have their: (i) standard of living adversely affected; (ii) right, title or interest in all or any part of a house, land (including residential, commercial, agricultural, plantations, forest and grazing land), water resources or any other moveable or fixed assets acquired or possessed, in full or in part, permanently or temporarily adversely affected; (iii) business, occupation, place of work or residence areas adversely affected with or without displacement; or (iv) community resources adversely affected.

Development Project: the planning, design and implementation of an activity with the general objective of contributing to the sustainable development and growth of a country;

Environment: the physical, biological and socio-cultural conditions within which a living organism or community exists, i.e., the sum of all external conditions that affect an organism or community and influence its development or existence.

Environmental Authority: the authority responsible for environmental protection and management and inspection of impact assessment work. In Lao PDR this is the Water Resources and Environment Administration (WREA).

Environmental Assessment (EA): the process of study and prediction of positive and negative impacts on the environment (including the social environment) together with determination of appropriate measures to avoid, reduce, or mitigate adverse impacts. Under Decree 1770 an EA can be either an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA).

Environmental Impact Assessment (EIA): An assessment, evaluation, and comparison of appropriate prevention and mitigation measures for the likely environmental impacts of a project, together with proposed compensation measures for losses resulting from the road project, and a proposed Environmental Management Plan (EMP).

Environmental Management Plan (EMP): a plan stipulated in an IEE or EIA which defines environmental protection and impact mitigation measures required during construction, operating stage, and project termination (post-operation). The EMP identifies responsibility and schedule for implementation along with costs.

Environmental Monitoring (EM): the monitoring and evaluation of (i) project impacts and performance against a set of pre-defined parameters or indicators measuring environmental and social characteristics; and (ii) compliance with a project's specific, and approved, Environmental Management Plan in accordance with the processes, defined environmental quality criteria, and timeframe defined in the plan.

Ethnic Minorities Development Plan (EMDP): per Decree No. 192 and its Regulation No. 2432, the process by which the impacts (positive or negative) on ethnic communities are addressed in a project. Where the impacts will be due to land acquisition only, a separate section will be included in the resettlement plan to address ethnic communities' issues and mitigation measures. Where the project will likely have significant positive or negative impacts on ethnic minorities, beyond land acquisition impacts, the project owner will prepare, in strict compliance with the Decree and Technical Guidelines, an Ethnic Communities Development Plan (EMDP) during the feasibility study phase of project preparation.

Initial Environmental Examination (IEE): the initial study to predict impact on the environment (including social components) from projects and development activities. The IEE and EMP are binding on development activities that are expected to have minor impact on the environment.

Land Acquisition and Compensation Report (LACR): per Decree No. 192 and its Regulation No. 2432, the documentation required for projects or sub-projects creating marginal or non-significant resettlement impacts, i.e., fewer than 200 persons (about 40-50 families) are affected by the project either marginally or with limited displacement

Participation: the process of discussion, information exchange, and hearing of the opinions of all parties and stakeholders directly or indirectly impacted by project development. Participation begins during the period of planning formulation, and continues through design, implementation and maintenance, and restoration prior to project termination.

Project Cycle (PC): the complete and overall process, or the life, of a project, which includes identification, pre-feasibility study, feasibility study, design, construction, operation, monitoring, and closure.

Project Owner (PO): any person, including juridical persons or organizations, that has the permission to study, explore, design, construct and/or implement a project. A project owner may be from the private sector, government, or any other organization.

Screening: categorization of a proposed project according to what types of impacts might be anticipated on the environment (including social impacts), based on project type, scale, location, and sensitivity, thereby determining what level of environmental assessment is required. The World Bank identifies four categories of project impact.

Social Assessment (SA): per Decree No. 192, the process of study and prediction of positive and negative impacts on communities (including communities, social networks) together with determination of appropriate measures to avoid, reduce or mitigate adverse social impacts;

Resettlement: per Decree No. 192 and its Regulation No. 2432, all measures taken by a project owner to mitigate adverse social impacts of a project, fully or partially, on the APs, including compensation for lost assets and incomes and the provision of other entitlements, income restoration assistance, and relocation, as needed.

Resettlement Plan (RP): per Decree No. 192 and its Regulation No. 2432, the document required by a project or sub-project that will create severe resettlement impacts, i.e., more than 200 people (40-50 families) are displaced or severely affected due to the loss of productive assets, incomes, employment, or businesses.

Safeguards: the policies of international donors such as World Bank and Asian Development Bank to prevent and mitigate undue harm to people and their environment in the development process. The policies provide guidelines for donor and Borrower staff in the identification, preparation, and implementation of programs and projects. Safeguard policies provide a platform for the participation of stakeholders in project design, and are an important instrument for building local ownership.

Scoping: as part of screening, the process of determination of impacts that require study, investigation, and/or collection of necessary data to report the environmental and social impacts and type of assessment required, which WREA will review and approve as the project's framework.

Social Action Plan (SAP): per Decree No. 192 and its Regulation No. 2432, a plan which defines social protection measures and impact mitigation; responsibility and schedule for implementation of social management plan; monitoring plan and assessment of impacts on society from the project that must be done including sufficient budget planning for society, activities required during construction stage, operating and project termination. The SAP is submitted with the IEE, EIA, or SA as the case may be.

Vulnerable Group (VG): a distinct group of people who might suffer disproportionately from the impacts of a project, including the loss of fixed and movable assets, other assets and production base, or face the risk of being marginalized from the effects of resettlement,

specifically including: (1) divorced or widowed female headed households with dependents and low income;(2) households with disabled or invalid persons; (3) households with persons falling under the generally accepted indicator for poverty as defined by the Ministry of Labor and Social Welfare, or the landless; and, (4) elderly households with no means of support; as defined within Decree 192.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The earth where we live does not belong to us. It is borrowed from future generations. We have responsibilities and duties to preserve and improve the environment for them. Problems related with the environment require effective regulations, to be efficiently solved. (Rhee 2002).

Lao PDR is a country with abundant natural resources, especially forests, minerals and fresh water resources. These resources are considered vital to the survival of the local people, for socio-economic development, poverty alleviation, and improvement of people's livelihood. Therefore the Lao government is promoting sustainable development and utilization of natural resources by both national plans to use this abundance and by concession to both domestic and foreign investors to develop projects for both public and private sectors. One key sector is part of the Asian Road Network. It will better link Thailand, Lao PDR, Vietnam and China and promote international economic and regional trade development or logistics to neighboring countries as well as for poverty reduction of all poor people living in rural villages in remote areas throughout Lao PDR.

Environmental Impact Assessment (EIA) is both a methodology and an effective environmental management tool aimed at avoiding negative effects on the environment and society by identifying, predicting and interpreting information on the potential impacts of a development project on the environment and people affected by the project. Impact assessment covers socio-economic impacts, noise, transportation, landscape, archaeology, air quality, geology, hydrology and ecology. Both the construction (rehabilitation) and the operation phase of

the development project are to be envisaged, and mitigation measures will be recommended to minimize impact to be acceptable levels and compensate affected people. Road project general fall under in the infrastructure category with requires such project to carry out an environmental assessment.

Infrastructure projects are utilized for development of public services that play an important role for development in any country. An EIA should be used to ensure that the selected infrastructure choices deploy the resource available as effectively as possible in pursuit of chosen objectives. Becker and Vanclay (2003) identified that EIA practice has historically been concerned with economic, finance, environment, and social aspects of development projects. There is growing concern about the environmental and social consequences of the development effort in order to promote sustainable development. Becker and Vanclay (2003) noted that development projects bring about interventions; as the result there are two paths of changes taking place; biophysical changes and socio-economic changes. These impacts on the society are included in the EIA study.

EIA is of great value, especially for a country like Lao PDR, which is at an early stage in its development, to create an effective EIA system as a high environmental management priority. By doing this, one can ensure that major infrastructure development and industrial investment projects are give adequate attention to their environmental and social implications.

EIA has its limitations in practice, however. Documents about EIA in East Asia (China Road and Bridge Corporation, 2009) state that “Whatever its limitations are in practice, EIA has no doubt made some positive contributions to environmental management”. (Severinsson, 2004). The positive relation between sustainable development and an effective EIA system is expressed, and EIA is deemed to be an essential tool in reaching sustainable development in many Southeast Asian countries.

The development of EIA in Lao PDR is interesting from a scientific point of view such as using methods compatible to existing data collection programs, including socio-economic matters, using both qualitative and quantitative information and allowing sufficient time for collecting and compiling baseline information (Guidelines for EIA in the Arctic, 1997). The unique Lao history includes development from a non-industrialized country with extreme

environmental degradation after the Lao war, which ended in 1975. Lao PDR has made considerable progress in the environmental field and in developing its EIA system, partly due to the country being one of the largest recipients of foreign aid in the world. Today, there exist EIA regulations, stipulated in the Law on Environmental Protection, and expected in various development ministries and in the newly formed Water Resources Environmental Administrative (WREA) of the Prime Minister's Office.

1.2 Background of National Road 13 N

The project to rehabilitate the National Road 13N is being implemented with funding from the PRC (People's Republic China) and from the government of Lao PDR. The rehabilitation is part of a countrywide approach adopted by the Department of Road to make improvements to existing Macadam pavement roads which are more than 42 years old and which are in poor surface condition.

National Road 13 N, which has a total length of approximately 1,683.6 kilometers, is one of these roads requiring rehabilitation. The section through Oudomxai Province is one section of this national road situated on the main route linking Thailand, Vietnam, Lao PDR and Southern China (shown in Figure1.2). The completion of this project is believed to "strongly improve international trade and local development in this area". The rehabilitation of the national road site is located in Xai and Namo Districts at Oudomxai Province, Lao PDR, which is also important part of extension of National road R3.The project directly, affects areas including Xai District and Namo District, and surrounding regions all have positive and negative effect from the project's long-term development. Figure 1.1 shows the national road through the two districts

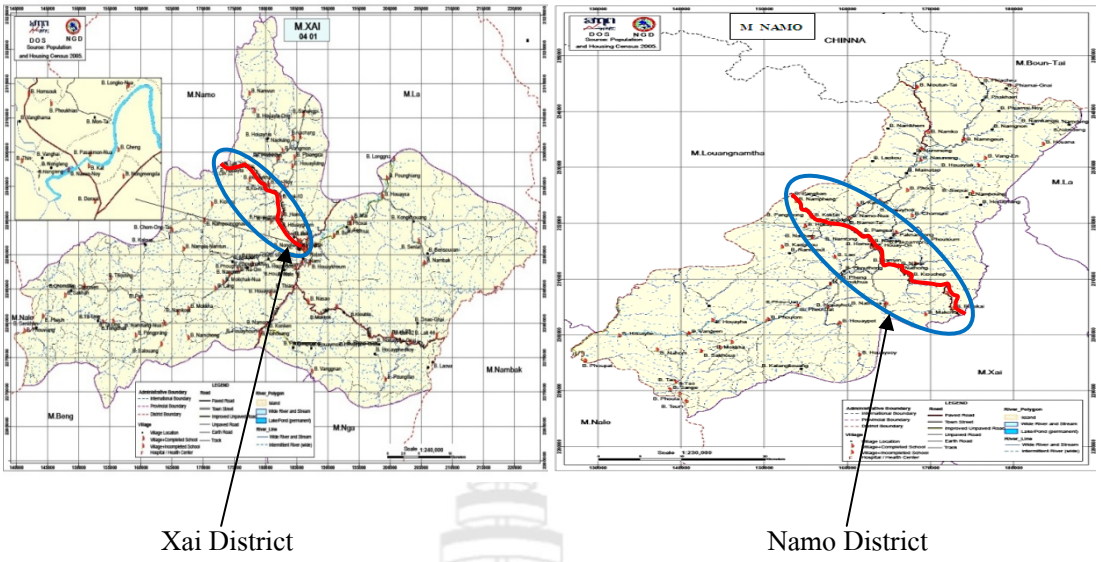


Figure 1.1 Maps of Two Districts for National Road 13N(Natinal Geographic Development, Census 2005)

Figure 1.2 Location of proposed National Road 13N, Oudomxai, Northern Laos, linking the Four Countries of China, Lao PDR, Thailand and Vietnam (MPWT, Lao PDR, 2009)

This project will connect national road R3 from Na Teuy in Luang Namtha province, Lao PDR, which links to Borhan in China, Chiangkhong in Thailand and Thachilek in Myanmar and connects road 2E, which links to Dienbienphu in Vietnam, covering all urban and rural areas in Oudomxai Province.

There are three highways going to Lao PDR. The transportation infrastructure in the three border provinces in the northern part of Lao PDR are not well developed, especially in Oudomxai Province, which is the center of transportation.

1.2.1 Necessity of Rehabilitation

Rehabilitation of this project is necessary for socioeconomic development. With rapid development of agriculture in northern Lao PDR, the infrastructure is currently inadequate for economic growth. Transportation development is inseparable from socio-economic development. Therefore, projects will benefit from improvement of rehabilitation of the national road infrastructure, while socio-economic development needs will also be met.

Rehabilitation of this project is required as part of network planning and development. The project is an important segment that will join the provinces of Luang Namtha and Bokeo, and is also a part of the Asian Highway Network. The rehabilitation of national road 13N is an important guarantee of achievement of the Asian Highway Network, planning, as well as necessary promotion level of regional highway network and improvement of the regional transportation network.

Oudomxai is a new province, established in 1967 and consisting of parts of Luang Prabang and Luang Namtha Provinces. It is the natural crossroad of the north and an important transit point between Thailand, China and Vietnam with convenient access to these markets for agricultural and forest products, and it is located in the heart of northern region of Lao PDR. The total area of the province is 15,370 km^2; the area population is about 276,960 people (Oudomxai Socioeconomic Development Plan, 2010), comprised of 138,139 females and 138,821 males; the density of population is 18 persons /km2. The 14 ethnic groups living in this province are mostly subsistence farmers who cultivate highland crops in an area that is 85% mountainous. Average GDP is approximately US$651 per year as of May 2010. (Oudomxai Socioeconomic Development Plan, 2010)

Oudomxai Province is comprised of 7 districts including Xai District, La District, Namo District, Nga District, Beng District, Hun District and Pakbeng District , with 60 regions, 473 villages, and 46,244 households included three big ethic groups as 60% Khamu, 25% Laolum and 15% Hmong of total population in Oudomxai Province (Oudomxai Socioeconomic Development Plan, 2010). Oudomxai has a 15 km international border with China to the north, and shares provincial boundaries with five Lao provinces. The North shares border with Phongsaly and China for 65.5 km and 22.5 km, respectively. The East shares a border with Luangprabang for 183.25km, the South shares a border with Xayaboury for 120 km, and the West shares a border with Luangnamtha and Bokeo for 160km and 110 km respectively. Oudomxai is the natural crossroad of the north and an important transit point between Thailand, China and Vietnam with convenient access to these markets for agricultural and forest products (Environmental Inventory, March 2000).

1.2.2 Nature and Culture

Oudomxai is one of the prominent areas to explore the amazing nature of Lao PDR and Southeast Asia the heart of Northern Lao PDR. Untouched forests, mountains, caves, and waterfalls characterize the province.

Big trees are breathtaking, but the forests are more- a whole cosmos of life. If silently walking through the forest reptiles like saurian and snakes are found easily. These shy animals are threatened in more populated and industrialized areas but are still very numerous in natural forests as here in Northern Lao PDR. Besides a high variety of vertebrates the pristine forests harbor an infinite number of insects of which butterflies are among the most colorful. An explorer will easily find all kinds of beetles, ants and millipedes crawling on the forest ground. Chom Ong Cave it ranks now as the longest cave in Northern Lao PDR and is one of the top 20 in all Lao PDR. (Oudomxai Province Environmental Inventory, 2000)

There are numerous hill tribes habituating the province. Khamu people are from the biggest ethnic group in Oudomxai province. They are considered as the ‘guardians of the land’ and have settled in all northern provinces of Laos. They are living in the mountains, dry-rice cultivation and slash-and-burn techniques characterize their traditional economic system. Hmong are part of the Lao Soung; the “High Lao”.They came to the area of now Lao PDR around 150

years ago after they lived several thousand years in the region of Southern China. (Oudomxai Province Environmental Inventory, 2000)

1.2.3 Tourism

Oudomxai consists of several villages (called "Ban") and two bigger towns: Xai District (the provincial capital) and Namo. The province is home for several ethnic groups which you can experience in villages, where people still live their traditional life.

Table 1.1 Tourist Attractions of Both Districts (Xai and Namo Districts)

Village/Location	District	Attraction
Huay Nam Kat Waterfall	Xai	Located close to an ethnic minority cultural village (Ban Bo) well knew for their skill in producing handicrafts, especially rattan baskets.
Lak11 Waterfall	Xai	11 kms from Xai. Short walk to the Khamu village of Ban Nangiew
Ban Jeng Temple	Xai	Historic temple but also fine views of Namkor and surrounding countryside
Nong Nouan Cave	Xai	Located at Ban Nachang about 1 hours walk from Ban Huaykhai
Mok Fek Cave	Namo	A series of nine caves about 54 kms far from Xai District. The cave was extensively used for the storage of equipment during periods of warfare
Ban Nathong	Namo	1 km from National Road 13N to the spring water

Note. Department of Commerce & Tourism, Xai District, "Oudomxai Province Environmental Inventory, 2000", Ministry of Public Works and Transport.

The development of an efficient transport system is of paramount importance for the socio- economic development (including poverty reduction) of the country, as well as regional integration. Despite a growing transport demand, access for both passengers and freight is

constrained by an inadequate transport network that is limited in coverage and in poor physical condition.

The entire Lao road network in 2002 was roughly 32,600 km, comprised of 7,200 km of national roads (22%), almost 9,000 km of provincial roads (27%), and 16,500 of district and local roads (51%). As of 2002, more than half (53%) of the national network was paved, with the remainder being roads with gravel or earth surfaces. At the end of the 1980s, the road network was in very poor condition and further deteriorated due to lack of funding and appropriate maintenance. In 2000 about 61% of the total national roads were classified as in poor or bad condition and only 16% in good condition. Since that time, about one third (2,600 km) of the 7,200 km of national roads have been rehabilitated or improved to all-weather standard through programs funded by international cooperation (Table 1.2)

Table 1.2 Road Network in Lao PDR

Type of Roads	Road Networks			
	National (km)	Provincial (km)	District (km)	Total (km)
Paved	3,820	900	-	4,720
Gravel or Earth surface	3,380	8,100	16,500	27,880
Total	**7,200**	**9,000**	**16,500**	**32,600**

From Alberto Nogales, May 2004, Revised by IESD. (2009). **Environmental and social operations manual for road sector**. Vientiane, Lao PDR: The Public Works and Transport Institute (PTI) and Department of Roads.

Note. Table 1.2 Road Network in Lao PDR and included National Road 13N is 1,683.6 Kilometres, (Mr. Phonepadit Deputy Director the Project), 2010

1.3 Problem Statement

The Rehabilitation of the National Road 13 N is a large project in the Oudomxai Province and is a good example of the type of infrastructure projects to be introduced by the government to improve socioeconomic and environmental conditions for the local people and communities living along this route. The road section to be studied covers a distance of 78 kilometers in two districts, Xai District and Namo District, which comprise twenty-three villages (Navanhnoi; Vanghai; Homsouk; Lak4; Homxai; Lak10; Kornoi; Huayta; Lak22; Nambortakai; Kulong; kiewchap; Nathong; Namveuntai; Huayon; Homxai; Namsea; Natong; Namotai; Pangdou; Tungthong; Nampheng; and Nahom). The section of National Road 13N selected for this study covers an area which was not included in an environmental impact assessment. That is this road project did not carry out or not conduct an EIA by either the project proponent, the project owner (The Department of Roads), or the selected contractor, who came from China[1]. There are therefore several issue of concern related to the socio-economic and environmental impacts of Rehabilitating of the National Road 13N from Xai District to Namo District in Oudomxai Province. These issues are summarized as follows:

1. Social impact issues: Loss of physical assets (houses, shops, lands and structures)
2. Environmental impact issues: habitat loss, erosion and soil loss and sediment load impacts to surface water quality, noise/vibration from road operation, air quality from transport-tation , safety issues (road speed control and accidents), increase in illegal logging and changes in land use.

According to Lao EIA Regulations, it is the project proponent that is required to undertake the EIA and to ensure that the selected contractor is aware of and agrees to abide by the mitigation measures and the compensation package approved during the EIA approval process (EIA Regulation No. 1770/STEA, October 2000). EIA Regulation of Road Sector (MCTPC, 2004). Regulation of Environmental Impact Assessment of Road Projects in Lao PDR, Published by SIDA, in Vientiane Capital City, revised 2004.

3. Economic impact issues: tourism and trade with neighboring districts, provinces, and countries which can create economic opportunities, including increased revenue and employment, reduction in travel time to schools and hospitals less wear and tear on vehicles (lower maintenance costs), and improvement in access of the population to such services and to markets.

4. No ecological impacts were deemed to have occurred because the road did not pass through environmental sensitive or protected areas (such as Biodiversity Conservation Protected Area).

Therefore, this thesis research will study and attempt to quantify the negative impacts from rehabilitation of the road along this section and to develop or suggest appropriate mitigation measures and compensation levels to the actual project impacted persons (PAPs) and to compensate for lost physical resources from the rehabilitation of the National Road 13N project. Each impact will be estimated (quantified as best possible) and a cost assigned to each aspects of the impact to show all costs associated with this project to the Lao stakeholders. Thus, a total cost figure will be derived; including all the "externalities", to demonstrate how much exactly should be included in the total cost of this road rehabilitation project.

In addition, the study of socio-economic and environmental impacts before and during rehabilitation of the national road will help to clarify and understand the current situation of these communities. The results of the study will serve as a good lesson for many communities who are affected by developing the rehabilitation of the national road projects in the Lao PDR.

1.4 Hypothesis

The hypothesis of study is "To clarify the full costs of the National Road Rehabilitation Project using a section through Oudomxai Province as a case study in order to internalize all impacts on socio-economic and environment resources and also to provide appropriate mitigation measures and compensation to communities impacted by infrastructure project".

1.5 Main Research Questions

The main research question is: What are the social, environmental, and economic impacts of National Road 13N, and what are the appropriate mitigation schemes to protect the environment and compensate project affected persons (PAPs) and communities using a section of the road through Oudomxai Province as a case study?

Specific questions:

1. What are the impacts to the environment (especially natural resources and physical resources)?
2. What are the impacts to the communities (loss of assets, such as houses, shops, garden land and structures)?
3. What are the estimated costs of these social and environmental impacts?
4. What are the appropriate mitigation measures to reduce the negative impacts from the Rehabilitation of National Road 13N?
5. What are the total rehabilitation costs including externalities of National Road 13N for the 78 kilometers section being studied as a case study?

1.6 Research Objectives

This study intends to identify negative social, environmental, and economic impacts from the rehabilitation of National Road 13N, and to establish the appropriate compensation scheme using Lao EIA Regulations and "best practices" mitigation measures to total the costs of externalities and provide appropriate corrective measures to offset damages to the communities in Xai and Namo Districts, Oudomxai Province. However, this rehabilitation road project was just completed and more time is needed to permit such benefits to occur before a proper evaluation of the positive changes to impacted communities can be made. Therefore, this thesis served to document baseline data on livelihoods, income, education and health, but did not attempt to

quantify the positive impacts ("benefits") expected from the Rehabilitation of National Road 13N.

Specific objectives:

1. To determine and quantify the impacts of rehabilitation of National Road 13N on social and environmental components in Xai and Namo Districts, Oudomxai Province

2. To develop options for mitigation measures and compensation packages to offset the negative impacts

3. To involve the communities in selecting acceptable mitigation measures

4. To calculate the costs of the social compensation and environmental mitigation package selected and acceptable by the communities to offset project externalities

5. To calculate the real costs of the rehabilitation road project to the Lao people by internalizing the social and environmental costs of the project.

1.7 Expected Outcomes

The expected outcomes of the thesis fall into four categories:

1. Identification of the socio-economic and environmental impacts,

2. Identification and evaluation of mitigation measures which should be incorporated into the road construction project as part of the rehabilitation of the national road project

3. Involvement of public participation by having the villagers expresses their preferences for compensation and mitigation measures.

4. Determination of the true cost of the road rehabilitation project to the Lao people by internalizing the social and environmental costs; and

5. Application of lessons learned from this study to other national road rehabilitation projects in Oudomxai Province and throughout Lao PDR.The lessons learned will also serve as guidelines for capacity building among government staff in the Provincial Department of Roads and will be useful as a case study for training purposes.

1.8 Scope of Study

The scoping stage is important in identifying major social and environmental impacts and mitigation measures of the development projects and only those identified impacts will be studied in detail in the EIA along a 78 kilometers section of National Road 13N project in Xai and Namo Districts including 23 villages located along the road in these two districts of Oudomxai Province, Lao PDR.

1.9 Conceptual Framework

The proposed thesis research will be a participatory study conducted within the conceptual framework as shown in Figure 1.3.

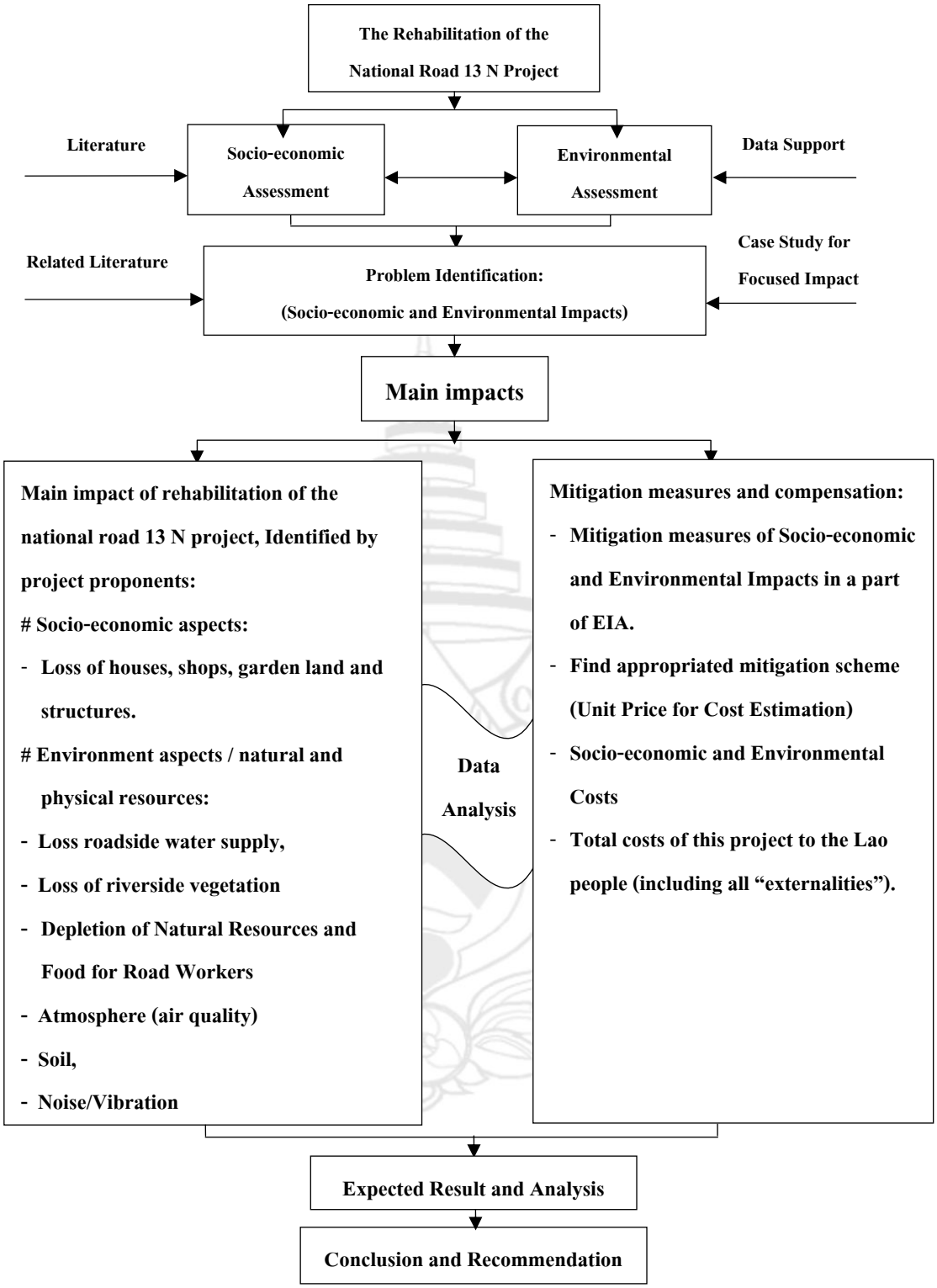


Figure 1.3 Conceptual Framework of Study

CHAPTER 2

LITERATURE REVIEW

A review of the literature on rehabilitation of the national road projects, and sustainable development has been useful to identify the thesis research objectives and the methodologies that will be applied to arrive at lessons learned and conclusions. This thesis research will use theory and applied research methods to carry out the study process.

2.1 Conceptual Framework of Socio-economic and Environmental Impacts

A decision making on project development generally considers on the environmental and social impacts in order to be sustainable development. Decision markers would like to perceive what outcomes are after establishing the project; they assess both positive and negative impacts. These impacts can either assist or impede the project implementation because some groups gain benefits whereas others are negatively affected. Becker and Vanclay (2003) supposed that the proper application of EIA and SIA can improve the quality of project proposals and eventually lead to savings in project implementation because it can reduce impacts and increase acceptances of project objectives.

Many countries regulate the EIA on project developments, and the social consequences are increasingly considered in the feasibility study. However EIA and SIA studies define changes in two paths which are biophysical and social setting as first order changes. In the left-hand side, there are the biophysical changes in natural properties of resources that cause biophysical impacts. These impacts affect community values of those resources (Becker & Vanclay, 2003). An example is ground water project for irrigation of a community's agricultural lands. Irrigation (intervention) changes the level of groundwater (biophysical change processes) which has the impact on the usage function of grassland productivity (biophysical impacts).This impact

indirectly affects the farmers earning income from cattle raising (indirect human impacts). For long term if this change is not appropriately mitigated, it will expand to be other impacts as the second order changes. This cycle is reiterated following these above steps. The EIA considers only the social impacts resulting from biophysical impacts which indirectly affect human impacts. In the right-hand side, the project causes social change processes directly intervened on human impacts (social impacts). In the same way, these human impacts can invoke the community to produce social change processes as the second order.

2.2 Sustainable Development:

The concept of sustainable development came into existence in the 1980´s along with the growth of the environmental protection movement. Defined by the World Council on Environment and Development in 1987, sustainable development refers to a: "*Development that satisfies the needs of the current generation without compromising the capacity of future generations to satisfy their own needs".* Today sustainable development aims to improve quality of life in a comprehensive manner, including economic prosperity, social equity, and environmental protection. Economic, social, environmental and cultural aspects must be integrated in a harmonious manner. (Severinsson, 2004). Thus environmental impacts assessment is considered a basic and essential tool of sustainable development.

Sustainable development is part of the new efforts to integrate environmental, economic and social considerations into a new development paradigm (Baker, 2006).

Sustainable development is about enhancing human well-being through time. What constitutes a good life is highly subjective, and a different aspect of well-being varies for individuals, societies, and generations (World Development Report, 2003). Thus public participation and feedback from project impacted persons (PAPs) are an integral part of the EIA process.

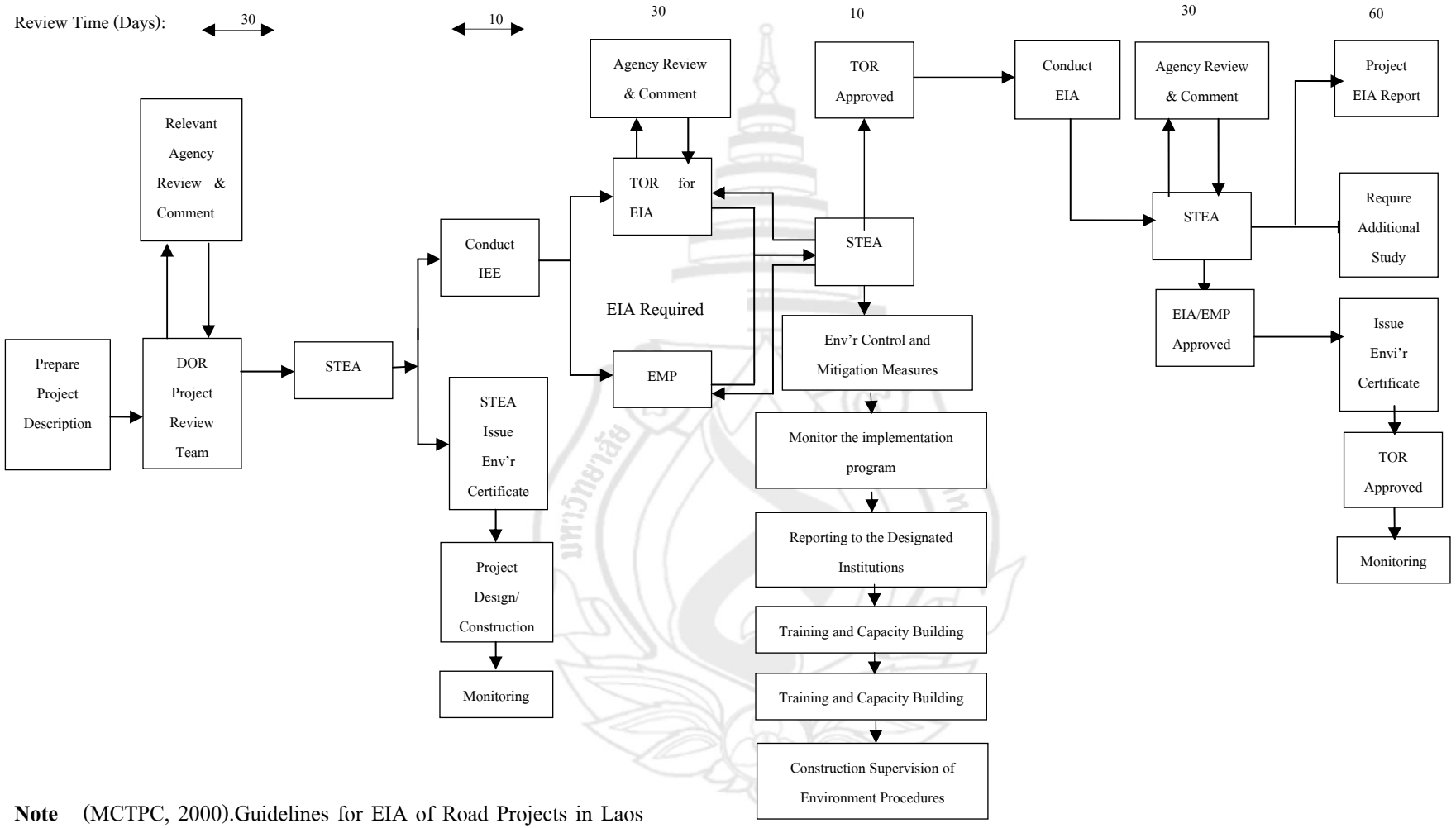
2.3 Application of the EIA Process

The first step in Lao PDR's EIA process involves screening of the project description[2] to determine it the project is exempt or non-exempt from EIA. If screening[3] of the project description determines that EIA is necessary (i.e., the project is not exempt from EIA), the next step for the EIA team is to carry out an initial environmental examination (IEE) [4]. The IEE will identify and prioritize significant environmental impacts (SEIs) and environmental protection measures (EPMs) to the extent possible. The Environmental Review Agency, will determine if more environmental work is needed, and if so, will prepare a Terms of Reference (TOR) together with the project proponent for the conduct of a detailed EIA. The EIA process is described also in the Department of Road's (DOR) Regulation for Environmental Impact Assessment of Road Projects (MCTPC, 2000). A diagram of the process is shown in Figure 2.1.

[2] In terms of project phases, the project description would be a product of reconnaissance studies, ADB TA 3133-LAO.

[3] STEA's EIA Regulation stipulate that screening is done by a "project review team" composes of representatives for DOR and other agencies. ADB TA 3133-LAO.However, the new WREA Decree (February 2010) includes a screening list which clearly identifies all types of development projects which require an IEE or EIA prior to their approval.

[4] The EIA team is the consulting firm or qualified group of consultants selected and employed by the project proponent(s) to study and report on the socio-economic and environmental impacts of the proposed development project.



Note (MCTPC, 2000).Guidelines for EIA of Road Projects in Laos

Figure 2.1 Environmental Assessment Process for the Lao PDR Department of Roads

2.4 EIA Process

Procedure on initial environmental examination or environmental impact assessment, as well as procedure on deliberation of report on initial environmental examination or a report on environmental impact assessment, must be in compliance with the project cycle of the investment project, and be in accordance with the laws of the concerned agencies. The EIA process relates to project development as shown in Figure 2.2 the EIA Process

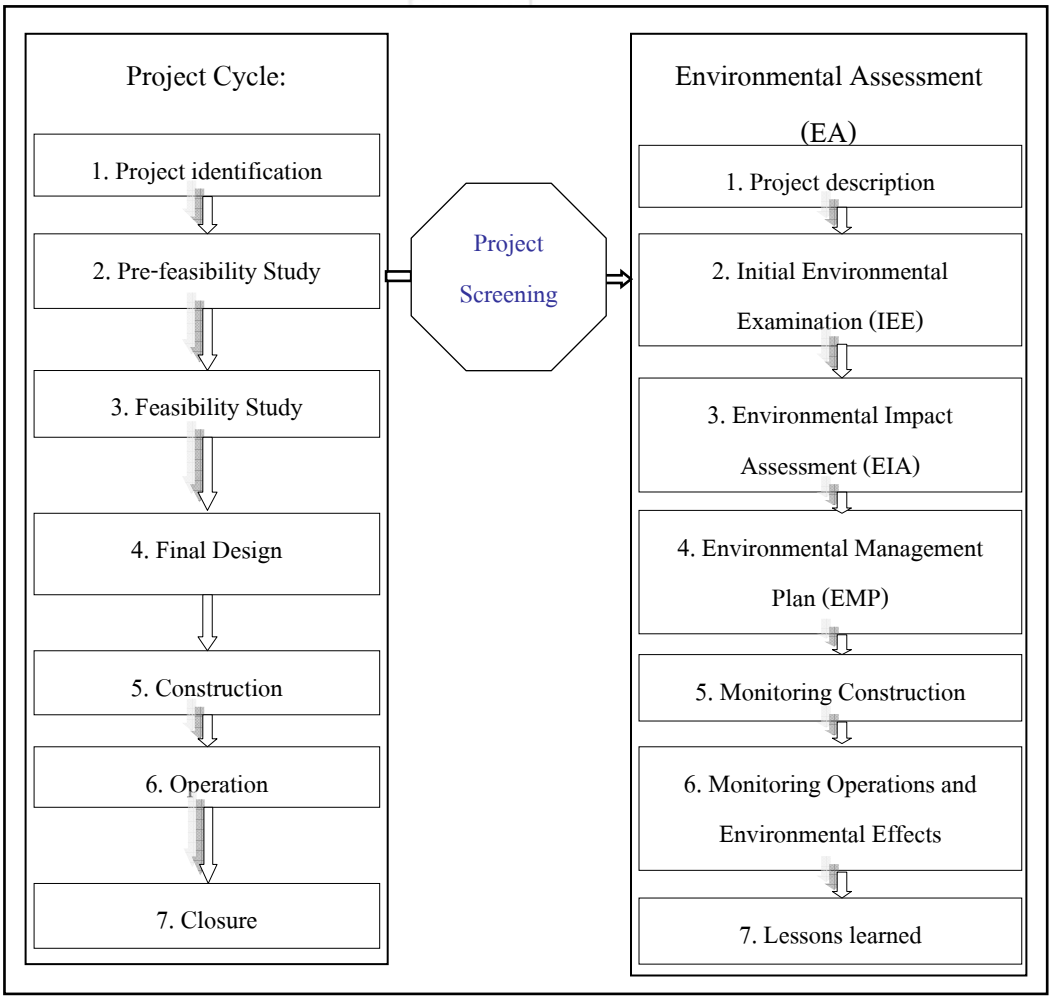


Figure 2.2 EIA Process from published references, Course on ESIA and Risks Analysis, NREM, Mae Fah Luang University, 2009.

2.5 Demographic Processes

Demographic Processes relates on the movement and composition of people in the regions affected by the project are shown in Table 2.1

Table 2.1 Demographic Processes

Processes	Descriptions
-Processes relate to natural birth and death rate -In-migration relate to population growth of people from other areas.	-Indirect impacts on it but some activity affect on it.
-Out-migration relate to decline on population due to some families moving out of the region.	-There are sub processes; presence of newcomers; presence of temporary workers presence of presence of temporary workers presence of seasonal residents; presence of weekenders; presence of tourists .
-Changes in population due to direct causes.	-Because of job-finding or change place natural resources, and due to traffic owner property are surrendered to move to live; it has categories; resettlement which with compensation; displacement which project cause to lost property without compensation as side effect on it; rural to urban migration which project accelerate rural people move to city in order to find job or social services; Urban to rural which such case on Europe that people chose to live on rural.
-Changes in population due to direct causes of employment, loss of access to accidents related to the project.	-environment because of good transport between rural and urban.

From Becker, H. A., & Vanclay. (2003). **The international handbook of social impact assessment: Conceptual and methodological advances**. Cheltenham, UK: Edward Elgar Publishing.

2.6 Economic Processes

Processes involve the economic activities which are affected by project on whole society or people as described on Table 2.2 The Economic Processes

Table 2.2 The Economic Processes

Processes	Descriptions
-Waged labor conversion and diversification of economic activities.	-Change in number of available jobs -Change in type of jobs from one to another such as agriculture to production.
-Impoverishment	-The process made downward spiral poverty
-Inflation	-It is possible from the nation inflation but for local level may cause increasing spending power of high income people.
-Currency exchange fluctuation (devaluation)	-Changes in exchange rates of local currency
-Concentration of economic activity	-Lack of diversity of activity lead to be vulnerable of commodity
-economic globalization	-Increase on economic incur oration instead of local level to be region or globalization

From Becker, H. A., & Vanclay. (2003). **The international handbook of social impact assessment: Conceptual and methodological advances**. Cheltenham, UK: Edward Elgar Publishing.

2.7 Project Baseline Development

The project baseline development deals with much information (CUTR, 2000) suggested an iterative framework that can be updated the new information. These suggested processes serve as a guideline to get the relevant information, to summarize the elements of community and to document the information.

2.7.1 Review Socio-economic and Environmental Characteristics

The review of population, housing and economic characteristics yields the trends of the project site, insights into how the project affects economic issues, and change-levels of social and environmental cohesions (CUTR, 2000).

The review forms the basis for what is described as "baseline" data:

Data sources of population, housing and economic information depend on each country, where they are available such as government, administration, department, and statistical department and bureau. Table 2.3 presents a list of the requested data;

Summarizing and highlighting the above data for the further insights into the trends of community or some findings. Summaries should address; the major population change, location, and path of high growth areas, number of affected unit, length of residency and vacancy rates, characteristics of population affected by project in terms of age, racial and ethnic composition, employment and relative income distribution, location of special people, labor force characteristic.

Table 2.3 Required Data for Review of Community Profile (Baseline data)

Demographic characteristics	Economic characteristics	Housing characteristics
-Population and growth trends	-Unemployment rate and trends	-The age, type, and condition
-Age distribution	-Work force characterization	-Vacancy rates and trends in the community and length of residency (percentage of residents in home while operation project)
-Average household income	-Dominant business sector type	
-Special groups' data such as minority, elderly persons or disabilities	-Major employers and industries	-The extent and availability of low-income housing in the affected community
		-The type of occupancy in the study area (renter or owner)

Note. SIA Development for Road Project in Thailand. May 2005.

2.7.2 Identify Community Issues and Attitudes

The project baseline requires the finding details of the primary data; that the issues and attitude will be specially addressed by the community in order to understand the potential impacts. The identification is conducted mainly by talking to knowledgeable persons; visiting the community; interviewing stakeholders, and reviewing secondary sources (CUTR, 2000)

Review the secondary sources of information can reveal the community issues and design the social analysis. Taylor et al. (1990) recommended that secondary data are useful when the project is limited resources for conducting the survey or field study. The good secondary sources are local government comprehensive plans and amendments, evaluation and appraisal reports, local policy studies, media reports, editorials, minutes of public hearings, published local histories, government reports and the early photo versus current area. In addition, public comment from public hearing can address social issues and attitudes on the projects compared with the similar past project.

Talk to knowledgeable persons who know well about community is a good starting point for address issues and some perspectives. This can interview and field visits on the few people such as local planning administrator; planning director; executive director. This step is a method for gaining the background of community, narrowing the key issues down when assessing social, economic, and environmental impacts. It should include the auditing and monitoring of projects and policies with social and environmental effects. Due to social issue identification related to the different orientation, Taylor et al. (1990) supposed that the relevant agencies should provide the own institutional bases of social policy, SIA, social development. They should increase the coordination of procedures for SIA and EIA.

Visit the community is direct observation of the community life. Observes visit without bias to know how people meet their daily needs, where people congregate. This guideline proposed the two methods for gaining the community's issues and attitudes: first, the participant observations by the observers spent time with participants and watched their business or community life; second, a field surveys filled information gaps, improved validity of secondary data sets, and aided in the identification of issues.

Interview stakeholders, who are anyone staked on the project, are divided into two groups; the directly and indirectly affected groups. The first groups are such property owner;

representatives of affected neighborhoods. The second groups are such official, NGO, nearby communities. They will yield the wealth on formation for identifying issues and attitudes. When the interviewers should listen rather than speak because of baseline wanted learning from respondents without interviewer perspectives. Some example questions are recommended in

Table 2.4 The Sample Questions

	Sample questions might include;
1.	Do you have any questions or concerns related to this project?
2.	Are you familiar with the concerns or expectations of other groups in the community regarding the project? How would you characterize those issues?
3.	What (if any) has been your experience with (our agency)? What (if any) has been your experience with public involvement activities on our past projects?
4.	What are the best ways to communicate with you and involve you or your organization in project decisions?
5.	Who else do you think we should talk to about this project?

From Center for Urban Transportation Research (CUTR). (2000). **Community impact assessment**: **A handbook for transportation professionals**. University Floridian of South Florida

2.7.3 Socio-Cultural Processes

Processes affected the culture of groups within communities or people live as shown in

Table 2.5 The Socio-Cultural Processes

Processes	**Descriptions**
-Social globalization	-Global exchange on culture
-Segregation	-Processes of creation of social difference within community
-Social disintegration	-Processes refer to falling apart of existing social and cultural network
-Cultural differentiation	-Processes increase the differences among groups such as cultural value

Table 2.5 (continued)

Processes	Descriptions
	tradition, ritual and language so forth.
-Deviant social behavior	-Disadvantageous for female portion of the localpopulation; few are accepted for jobs, and migrant workers encourage outside females to enter the "service" industry, which has its negative impacts on family life and local female population
-Gender bias or impacts	-Type of people groups who might be deviant or antisocial, may occur the risk behavior and vandalism.

From Becker, H. A., & Vanclay. (2003). **The international handbook of social impact assessment: Conceptual and methodological advances**. Cheltenham, UK: Edward Elgar Publishing.

2.8 Proposed EIA "Best Practices"

The EIA study of each alternative is reviewed for its potential environmental impacts and its costs. These alternatives are evaluated by weighting criteria in order to select the proper alternative, including acceptance by the local population if adequate public participation is included in the EIA process. The considered criteria are engineering, transportation and traffic, environment, financial, economic, and degree of acceptance by the PAPs. Potential environmental issues of the selected alternatives are then summarized to point out the need for further assessment. Environmental impact assessment of alternative considers design of road and bridges, transportation and traffic prediction, socio-economic and land use of affected area, public involvement from community leaders and affected groups (positive and negative). Design of alternative sis revised according to recommended results of the EIA study and public participation meetings. Project information is articulated to the public. Finally, EIA report and executive summary report are documented to submit to the relevant offices for approval of the project.

Furthermore, international development agencies and finance institutions (IFIs Performance Standards and Equator Principles) accepted to extend road planning and design scopes to consider environmental and include such issues in proposed projects thus enforcing the recipient project proponents as well as governments to accept environmental and social impacts as part of transport development projects For example World Bank (1999) assessed social and cultural issues in environmental assessment. UNESCAP (2001) corrected misconception of EIA to equal emphasis on social impacts; therefore it proposed a new term environmental and social impact assessment (ESIA). JICA, 2004) weights environmental impacts as well as social impacts including involuntary and human rights of indigenous people.

Environmental Impact Assessment: The completion of this project will strongly improve the regional social and economic development. Meantime, during the rehabilitation or construction of the project, the protection of the surrounding natural and ecological environment should be emphasized. The protection principles are: the maximum protection; the minimum damage; the most powerful recovery. The best efforts should be made to be in corresponding to this project in the local environment;

The drainage and protection designs of the abutment slopes should be harmonized with the existing alignment and the environments to reduce water and soil losses. The road alignment length should be designed reasonably. The cut and fill of earth should be utilized by arrangements. The excavated ground is recovered as soon as possible. During construction, reliable measures should be taken to reduce dust, water and noise pollutions (Ministry of Communications," Feasibility Study Report Preparing Methods of Highway Construction Project", 2009).

Consideration for the Environment at Design Stage: The construction of the National road will affect the living environment and the natural ecology. Therefore, it is necessary to take some environmental protection measures for the implementation of the project. The assessments of the environmental impact will analysis the main environmental problem, the existing pollutants and the sources, and then provide the control measures based on the investigation of the existing facilities and the regional development plans, so that the project can meet the environmental requirements of the regional plans and improve the landscape and quality of the environment,

(Ministry of Communications," Feasibility Study Report Preparing Methods of Highway Construction Project, 2009).

The design of an alternative is revised according to the results of SIA (Social Impact Assessment Development for Roads Projects in Thailand, 2005). This document was developed as the guidelines for social impact assessment (SIA) for road projects in Thailand. Road projects are mandated to conduct environmental impact assessment (EIA) under Environmental Act, 1992. (EIA study of new Highways: Ban Kuha-A. Khanniang Paklor-No.408 highways. Final Report Vol1, Bangkok, Thailand, 2001)

2.8.1 Potential Negative Impacts Identified PAPs by Road Project

During the consultation and focus group discussions held in the selected villages, different groups of individuals also identify a range of potential negative impacts to be brought by the proposed subproject based on their own interests. Among these potential negative impacts, the land acquisition, demolition of houses and relocation of population were considered the major negative impacts by the project. However, since the rehabilitation of the national road will be based on existing alignment, the potential resettlement impact will be quite limited.

After extensive consultation with affected villages, the house demolition and property removal impacts could be mitigated by providing affected people compensation funds based on replacement value, and alternative housing land by the affected villages and paid by the Project. After resettlement, all affected people will be able to maintain their previous living standard and can continue their farming or trade activities. For temporary land occupation, efforts will be made to avoid occupying farmland or adequate compensation will be paid to affected people for their lost yields and the project owner will be responsible to restore the land areas into their original condition after construction. For various attachments, the compensations at replacement value will be provided, so that affected assets and village facilities could be restored into original conditions. For temporarily occupied land, if productive land is involved, the affected villages or individuals will be provided compensation for the lost yield, plus compensation for restoring them into original conditions.

However, since the RAP has not yet been disclosed to the local communities and affected people, some people interviewed did not have clear idea about the potential land acquisition and resettlement impact to be brought by the Project. They express desire of having more information

regard to compensation policies and potential negative impacts. It seems that during next stage of resettlement planning more meaningful participation should be organized with affected communities and individuals, and more disclosure should be carried out in order to improve basic understanding of the resettlement preparation for the Project and address concerns raised by the project affected people. Apart from land acquisition and resettlement, the villagers also identified other potential negative impacts during and after the road construction. They are mainly referring to temporary environment impacts during road construction and potential safety concerns when the new road is completed. For example, the villagers voiced some concerns regarding potential noise and dust impacts during road construction, increasing traffic around their villages, and possibilities of water pollutions caused by soil erosion and wastewater discharged from construction sites. In addition, villages and local officials also mentioned potential safety concerns after road construction with increasing traffic volume and increasing speed. For these types of concerns, detailed mitigation measures have been developed and included in the project design documents, as well as project environment management plan and project safety component.

Table 2.6 Potential Negative Impacts Identified PAPs by Road Projects

Stakeholders	Potential project impacts
Male villagers along the road	• Loss of houses or attachments due to road construction • Lost the time to move the house or property to be affected • Increase dust and noise by heavy trucks during construction • The good road will lead to increasing speed and traffic on the road, which might cause more accidents for children or livestock •Dangerous of fast drive cars or trucks. •Dust and trafficking will cause problem during construction.
Female villagers along the road	• The improved road could lead to increase traffic speed along the roads, which might create more accidents for children and animals. • During construction, the dust and pollution might cause some impacts on villages living along the road, and having some environment and health impacts;

Table 2.6 (continued)

Stakeholders	Potential Impacts
	• More serious impacts are land acquisition and house demolition as well as removal of assets• The relocation of houses will create hardship and inconvenience for affected households.
Bus drivers and traders	• Inconvenience or interruption of road traffic during construction, which might increase operation cost and reduce profit for the transport business operators. • During construction, the existing roads and drainage might be damaged, which might create problems vehicles
Shop owners along road	• More serious impacts are lots of shops, and relocation of shops would result in loss of income and profit. • The improved road could lead to increase traffic speed along the roads, which might create more accidents for local villagers' and animals. • During construction, the dust and pollution might cause some impacts on shops along the road, and having some environment and health impacts;
Government officials	• Take time to restore the business or reconstruct house caused by road construction • Lost time for other activities to do • Large number of construction workers and increases traffic might bring some disease in the project areas, including HIV, more education is needed; • Sometime there might be conflicted between constructor's workers and villagers due to misunderstanding. • The improved road could lead to increase traffic speed along the roads, which might create more accidents for children and animals.

Note. The Rehabilitation of National Road 1B, Lao PDR (DoR, December 2008).

2.8.2 Social Practices

In this application of the laws, regulations and guidelines, as outlined previously are examined. The goal is to highlight the difficulties and shortcomings of applying and enforcing these rules in the present context of the Lao PDR and to illustrate the considerable progress that has been made in a relative short time regarding social mitigation measures in general and resettlement and public involvement experiences in particular.

The main findings (Guidelines for Environmental Assessment of Road Projects in the Lao PDR, Published by Department of Roads Environment Management Unit and SEATEC International, in Vientiane, Lao PDR 2000) in relation to practice based on the case studied as follows:

1. There has clearly been significant progress made in the past 10 years regarding resettlement planning and public involvement in the Lao PDR;

2. Resettlement practice has evolved from top-down approaches to consultant with potential resettles regarding every aspect of planning, from emphasizing compensation to restoration of livelihoods, and from technically dominated criteria to integrated planning;

3. Practice regarding road projects is in accordance with policy but there is a need to quantify ”reasonable” compensation and procedures to ensure consistent and fair application of policy;

4. Public involvement in hydropower and roads projects has been developing slowly to include stakeholders in planning and implementation but top-down approaches have been dominant in many cases

5. Gender related issues are factored into the planning and implementation processes;

6. Ethnic minority issues are considered in resettling communities in infrastructure projects;

The quality of EIA studies, in particular Social Impact Assessments, has not always been of the highest international standards-there is a need for greater quality control, better integration of social aspects in planning and greater independent and transparency for EIA consultants. findings (Guidelines for Environmental Assessment of Road Projects in the Lao PDR, Published by Department of Roads Environment Management Unit and SEATEC International, in Vientiane, Lao PDR 2000)

When assessing plans for mitigation and compensation, the ultimate indicators of success must be whether project affected persons can attain and sustain a better level of livelihood than before the proposed project intervention, and whether or not they are able to survive without being forced into the situation where they must exert negative impacts on the ecology or environment, or engage in illegal or anti-social activities.

2.8.3 Environmental Economic Practice.

This activity has evolved from conventional economic study of project in order to evaluate environmental amenities in monetary or value terms. Every project has monetary benefits or detriments that can be estimated for natural resources and social aspects. The environmental economist: a) works with the project planners and the EIA team in order to identify SIAs and the qualitative or positive impacts of the various project alternatives, and b) attached an estimated or project value to the various environmental amenities that could be affected by the project. The result from environmental economics evaluation gives project decision-makers an additional factor for judging the overall desirability of a project. ("Guidelines for Environmental Assessment of Road Projects in the Lao PDR", Published by Department of Roads Environment Management Unit and SEATEC International, in Vientiane, Lao PDR)

2.8.4 EIA studies in Lao PDR

Reviewing a number of Social Impact Assessment reports or SIA as part of EIA reports of various infrastructure projects has revealed a number of issues that are worthy of comment as part of improving social and environmental management planning. The two main findings of the SSEMP Team findings (Guidelines for Environmental Assessment of Road Projects in the Lao PDR, Published by Department of Roads Environment Management Unit and SEATEC International, in Vientiane, Lao PDR 2000) concern the generally poor quality of aspects of SIA and the need for transparency and independent studies.

Although the quality of these studies varies to a great degree, it can be said that many EIAs do not represent good examples of the high international standards of environmental and social assessments findings (Guidelines for Environmental Assessment of Road Projects in the Lao PDR, Published by Department of Roads Environment Management Unit and SEATEC International, in Vientiane, Lao PDR 2000). This is especially the case when the project

developer's or consultant's home country does not have high standards of social and environmental planning and still governed predominantly by technical criteria. And unfortunately Lao PDR is reduction to implement and enforce its own EIA regulation and standards on the project proponent, particularly if it is a foreign country serving as a donor agency. There are three areas in particular that need considerable attention.

1. A greater need for quality control
2. A need for better integration of social aspects in planning and implementation
3. A greater need for independence and transparency

2.8.5 Calculation Methods and Mitigations Measures

As previously stated, the EIA is the study, survey and analysis of data to serve as basis for the assessment of environmental and social impacts likely to be caused by the project in the short and long term as well as the proposition of development alternatives together with measures for mitigation of impacts and restoration of the environment (STEA, 2000). An environmental management tool that seeks to ensure sustainable development through the evaluation of those impacts arising from a major activity (development or infrastructure project) that are likely to have significant environmental or social effects. The EIA process is anticipatory, participatory, and systematic in nature and relies on multidisciplinary inputs. EIA has been applied for road project in Lao PDR (STEA, 2000), in which impacts are studied in four groups: physical, ecological, economic and social. Environmental impact assessment of alternatives considers design of road and bridges, transportation and traffic prediction, socio-economic and environment of affected area, public involvement from community leaders and affected groups (positive and negative). These impacts must be quantified as best possible in physical and economic terms, and the costs of mitigation measures compared in order to select acceptable and workable options for lessening such impacts to project impacted persons.

The Northern GMS Transportation Network Improvement Project by Ministry of Public Works and Transport and Department of Road (ADB11, May 2009), which studied the Environmental Management Plan (EMP) of the rehabilitation of National Road 13 N Project, determined that the positive impacts of the project would mask the negative impacts caused during construction stage. The adverse impacts during the construction stage can be mitigated by

implementing the suitable mitigation measures at proper place and time; however no details or quantifiable physical and economic figures were derived as part of the study. Thus no implementable Environmental Management and Monitoring Plan was developed as a part of the road project (National Road 6A by Ministry of Public Works and Transport and Department of Road (WB, January 2009) Rehabilitation of National Road 1B (DoR, December 2008), studied Resettlement Action Plan (RAP) for basis compensation rates and according to relevant laws and regulations in Lao PDR and proposed a set of compensation standards based on consultation with local government agencies, and held discussions with affected villages and individuals. They included compensation rates for land, structures, and other assets.

Therefore, the EIA is executed for the road rehabilitation project site. And impact assessment and mitigation measures for social and environment, air quality, soil, noise and vibrations are presented as follows:

The main objective of the Environmental Impact Assessment study is to identify the significant socio-economic and environmental impacts for the national road rehabilitation project as well as the mitigation measures by following the requirements of the Lao EIA Regulation.(Road Sector "MPWT Institute Environmental and Social Division", Final June 2009).

2.9 Lao Government Laws

2.9.1 Legal Frame Work

Policies of the Government of Lao PDR regarding environmental protection have received support from international donors, especially through assistance aimed at improving natural resources management and biodiversity conservation. Many policies have undergone rapid development over the last decade, with Lao PDR adopting its first National Environmental Action Plan (NEAP) in 1994 followed by a 2nd NEAP in 2000. Both NEAPs have emphasized priorities for environmental protection that are considered critical in establishing a framework for development and social equity as well as providing for the well-being of Lao citizens. The Government has developed enabling legislation and regulations increasing the emphasis on environmental protection. The Water Resources and Environmental Administration (WREA) has

been established following reorganization of the Science, Technology and Environment Agency (STEA) and its mandate focuses on the coordination and oversight of environmental affairs.

A summary of the legal instruments applicable to the road sector is presented in Table 2.7. (The Public Works and Transport Institute [PTI], published in Vientiane, Lao PDR, June 2009)

2.9.2 The Constitution

The Constitution of Lao PDR was adopted through a decision of the National Assembly in 1991(Decision No. 01/SPA, 14th August) and was subsequently revised in 1994. Article 17 of the Constitution states that: "All organizations and citizens must protect the environment and natural resources, land, underground, forests, fauna, water sources and atmosphere." This principle, together with Government's institutions to issue, implement and enforce environmental legislation, forms the basis for stakeholders to protect the environment (Institute Environmental and Social Division [IESD]. (2009). Environmental and social operations manual for road sector. Vientiane, Lao PDR: The Public Works and Transport Institute [PTI] and Department of Roads).

2.9.3 The Environmental Protection Law

Table 2.7 provides a list and an overview of the various laws, regulations, and guidelines applicable to environmental protection and management in the road sector. These laws, regulations, and guidelines are comprehensive, and cover all activities connected to the development and management of roads in Lao PDR, including the impacts that may occur both during construction and in the use of roads.

The 1999 Environmental Protection Law (EPL) is the central piece of legislation and main instrument for environmental protection and management. The EPL's basic principles of environmental protection are that: (1) the national socio-economic development plan shall include provisions to protect the environment and natural resources; (2) all persons and organizations residing in Lao PDR have an obligation to protect the environment and natural resources; (3) whosoever causes damage to the environment is responsible for the impact under the law; and (4) natural resources, raw materials, and energy shall be used in an economic manner to minimize pollution and waste and allow for sustainable development (Article 5).

Important provisions of the Law include the following:

Development projects and activities that have the potential to affect the environment shall require an environmental and social impact assessment. It is an obligation of all organizations to control pollution in accordance with environmental quality standards set forth in regulations by the various agencies involved.

Table 2.7 Legislation applicable to the road sector, and material sources and types of secondary data collection

Applicable Legislation and Regulations	**Objecyives and Contents**
Environment Protection Law 02/99/AN-(03rd April 1999) and its Implementating Decree 102/PM-(04th June 2001)	Defines principles, rules and standards for managing,restoring,protecting, and monitoring the environment in order to protect the public, natural resources, and biodiversity and ensure sustainable socioeconomic development of Lao PDR. The EPL requires local government to establish and maintain an environmental office to be the provincial branches of STEA (WREA).
Regulation on Environmental Assessment N.1770/STEA 200-(03rd October 2000)	Establishes"uniform"environmental assessment requriements and procedures for ensuring environmental protection in all development projects in Lao PDR. It states that sector ministries must"fulfil their obligations in issuing sector-specific environmental assessment(STEA) regulations" (Article 1.2)
Regulation on Environment Impact Assessment Road Projects in Lao PDR (Decree 2929/MPWT-2001)	Includes procedures for the implementation of the EA Regulation within the road sector, and defines the process to be implemented for each road project to predict the likely environmental impact including: (i) project of analysis and screeninf, (ii) Initial Environmental Examination(IEE), (iii) review and consideration of the IEE, (iv) process and content of a detailed Environemntal Impact Assessment(EIA) including Environmental Management Plan(EMP), and (v) Implementation of the EMP sources,prevention of soil erosion and maintenance of soil quality,conserving plant and tree species,wildlife apecies as well as environment and contributing to national socioeconomic development." (Article 1)
Law on Roads (Article 38.3) (04/99/NA-1999)	In relation to environmental management, the Law states that"the Road contractor shall perform the works in accordance with the drawings,providing good quality works with safety and protection of the April 03rd environment"(Article 15) and grants to the Departemnt of Road the power to control road activities including to "control the environment preservation in the road activities"

Table 2.7 (continued)

Applicable Legislation and Regulations	Objecyives and Contents
Law on Forest (06/NA-24th December 2007)	Determines"the basic principles,regulations and measures on sustainable management,preservation,development,utilization and inspection of forest resources and forest land....aiming for maintaining the balance of nature,amking forest and forest land a stable source of living and use for people,ensuring sustainable preservation of wwter
Law on Water and Water Resources(126/NA-02nd November 1996)	To ensure sustainable use throught a comprehensive set of rules,procedures,and policies related to ownership,conservation,management, and use appropriate rules,principles, and procedures are astablished for each category. Enables designation of watersheds(Article 25). Defines environmental consideration to be taken into consideration by infrastructure projects including preservation of sources of wter,flood protection,water damages,erosion,water supply ,aqatic flora and fauna.(Articles 7,29,30,31). According to Article 16"...building things which impede or divert the flow of water....etc..." is considered a 'medium scale use'. However,it is not clearly stated what scale of use road construction is and whether it is subject or not to prior permitting by the relevant water agency.
Protected Area Wildlife Regulations (07th June 2001)	Prohibits hunting and trade of numerous species consistent with the and CITES Convention

From Institute Environmental and Social Division (IESD). (2009**). Environmental and social operations manual for road sector**. Vientiane, Lao PDR: The Public Works and Transport Institute (PTI) and Department of Roads.

Note. Decree on environmental impact assessment No.1770/STEA-2000. (2000, October 3). Vientiane, Lao PDR: Water Resources Environmental Administrative, Prime Minister's Office 2.9.4 The Land Law

The Land Law, adopted by the National Assembly in 2003, is the principal legislation by which the State exercises its constitutional responsibility for tenure, access, use and management,

preservation of land. Several articles of particular importance to resettlement are summarized below:

Article 3 reaffirms that all land in the Lao PDR is the property of the national community (as stated in the Constitution, Article 15) for whom the State is the uniform central administrative representative throughout the Country and individuals… are assigned to effectively use the land… (Only non-forest land in private title or land held under a long-term lease can be transferred).

Article 5 protects the legal rights and benefits of those who have effectively received the right to use land including the right to transfer it.

Article 11 classifies land into eight categories, and subsequent chapters of the Law are concerned with the management of each. The categories are: agricultural land, forest land, water area land, industrial land, communication land, cultural land, defense and security land and construction land.

Article 43, refers to the certification of the lawful land use rights of persons or entities. There are two land registration methods (Article 44) by which individuals can register the land which they are using lawfully. First is systematic land registration, which is carried out throughout a designated area where land allocation, zoning, or classification is required. Systematic registration confers a Land Title. Second, persons or entities can make application to certify their right to use certain land. Under Article 48, land certificates are issued certifying the temporary right to use agricultural or forest-land which is issued by district level authorities. These land certificates can be inherited, but cannot be transferred or used as collateral,

Article 53 states that persons who have received the right to use the land have the following rights: to protect land for use for a specific objective, to use land a specific purpose in accordance with the State's allocation plan, to enjoy usufruct or income from the land, to transfer the right of land use, and to inherit the right of land use

Article 63 states that the right of land use shall terminate either through voluntary relinquishment of the land or if the State retrieves the land for public purposes. However, the landholder is entitled to just compensation for the taking of the state (Article 70).

Compensation is treated in Articles 68 to 72 of the Land Law. Article 70 states that persons or entities requiring a right-of-way and thereby cause damage to crops or buildings must make

appropriate compensation. Article 71 states that when the use of land belonging to other persons or organizations becomes necessary for the public interest, the State will compensate any damage suffered by the rightful user of the requisitioned land, as appropriate. Furthermore, the Law requires that each village, province, municipality, or special zone keep five percent of its total land area in reserve to ensure the compensation of requisitioned land evaluation of the damage is provided for by Article 72, which states that the evaluation will be done by a committee composed of representatives of the various concerned parties.

The Land Law does not specifically address itself to unregistered land users. It does, however, provide the registration and certification methods described above by which individuals can register the land which they are using lawfully. Article 82 further provides that persons or entities that are lawfully keeping, using, and developing land with efficiency will be awarded the right to use that land, all other conditions being met.

2.9.5 Resettlement and Compensation Standards

For people who will be inevitably affected by the project, the resettlement objective is to restore or improve their income to their original levels in accordance to national laws and regulations, and international accepted policy as demonstrated by the World Bank. The project owner will ensure that any person who losses land, other assets or income source will be assisted to fully recover their income and living levels."No persons should be worse off as a result of the development project. And the World Bank's Performance Standards were developed to ensure that all PAPs are better off as a result of the project (The Public Works and Transport Institute [PTI], published in Vientiane, Lao PDR, June 2009)

The resettlement and legal framework, and entitlement matrix for the Project are based on the World Bank Policy on Involuntary Resettlement (OP4.12), September 2009, the Constitution of Lao PDR (1991), the Decree 192/PM on Compensation and Resettlement of People Affected by Development Projects, (Government of the Lao PDR, 2005), plus the associated Lao policies, practices and technical guidelines in the Regulation on Resettlement and Compensation (2005). Also relevant are the Lao PDR Land Law, (1997), the Forest Law (1996), and the Road Law (1999). Where a gap exists, the World Bank policy has been used (Institute Environmental and Social Division [IESD]. (2009). Environmental and social operations manual for road sector. Vientiane, Lao PDR: The Public Works and Transport Institute [PTI] and

Department of Roads). The over-riding principle of the Resettlement Action Plan is that where a person or group is affected by land acquisition, damage to income generating assets/activities or resettlement as a result of the project, compensation will be allocated in order that livelihoods are the same or better than before the project (Institute Environmental and Social Division [IESD]. (2009). Environmental and social operations manual for road sector. Vientiane, Lao PDR: The Public Works and Transport Institute [PTI] and Department of Roads)

Article 6 - Compensation principles state that before compensation, a joint committee will be established to assess loss to PAPs (Decree 192/PM, Government of the Lao PDR, November 2005). PAPs will be entitled to compensation for structures at replacement cost, compensation will be payable for losses of income due to the project, and those without documented legal title will still be entitled to compensation for lost structures and other support so as not to be negatively impacted.

Article 6 - paragraph 6. States that PAPs who are living in rural or remote areas, who do not have any legal Land Use Certificate or any other acceptable proof indicating land use right to the affected land and assets they occupy shall be compensated for their lost rights to use land and for their other assets at replacement cost and provided additional assistance to ensure that they are not worse-off due to the project. PAPs in urban areas, who do not have any legal Land Use Certificate or any other acceptable proof indicating land use right to the affected land and assets they occupy and who have no land at other places will be compensated for their lost rights to use land and for their other assets at replacement cost and other additional assistance to ensure they are not worse off due to the project.

Article 8 - entitlement to economic rehabilitation measures if more than 20% of income-generating assets are lost due to a development project.

Article 11 - voluntary donation of land by APs is only acceptable if the impact on their income generation is not significant (less than 20% reduction), no physical displacement is caused, and APs are fully aware of their entitlements before relinquishing them.

Article 11 - project proponents will define mitigations measures and socioeconomic benefits to improve the status of ethnic communities which will be developed in consultation with the communities and in harmony with their cultural preferences.

Article 17 of the Regulations - requires a separate section on indigenous peoples issues and mitigation measures in the PAP. Where impacts on indigenous peoples are more significant an Indigenous Peoples Development Plan will be prepared.

The decree and its guidelines rectify key areas of the Land Law which would prevent informal land users from any eligibility, and also sets a clear definition of the "reasonable compensation" mentioned in the Land Law and determines these as replacement cost.

2.9.6 The Forestry Law

The Forestry Law states (i) that forests and forest land can be converted to other uses (i.e. for transmission line right of way) when necessary and in the public interest (subject to approval) from responsible authorities; (ii) an individual or organization given permission to convert forest to another use is responsible for payment of a conversion fee, land reclamation and tree planting; (iii) provision for allowing long practiced activities such as collecting wood for fences and fuel, non-timber forest products (NTFP), hunting and fishing for non-protected species for household consumption, and other customary uses. For removal of forests, compensation is based on the volume of timber (m3) of a given class of tree that will be cut down. Compensation is only paid for timber removed from private forestry plantations. No compensation is paid for timber removed from natural forests on public lands. Nor is any compensation paid for removal of NTFP such as bamboo. There is no requirement to replant trees on degraded land located away from a transmission line corridor, as compensation for removing trees to create transmission line right-of-way. Such forms of compensation only apply to reservoir clearing projects where it is necessary to plant trees to stabilize slopes that could otherwise fail through a process of mass wasting (National Rehabilitation Road ADB/11 between Luangprabang to Xayaboury provinces, Lao PDR, published in MPWT, May 2009).

2.9.7 The Decree on Resettlement (PM Decree No. 192/2005)

Lao PDR has specific legislation covering the compensation and resettlement of people affected by projects, including the Decree on the Compensation and Resettlement of the Development Projects (192/PM July 7th 2005) and the Regulation for Implementing Decree 192 (2432/STEA November 11th 2005).

Decree 192 defines the principles, rules, and measures to mitigate adverse social impacts and to compensate for damages that result from involuntary acquisition or repossession of land and/or assets. Such impacts include acquisition of land and/or resources, change in land use, and loss/restriction of access to community or natural resources affecting community livelihood and income sources. Decree 192 aims to ensure that project affected people (PAPs) are compensated and assisted to at least maintain, if not improve, their pre-project living standards, and are not left without the project. The objective of the Regulation is to implement Decree 192 and to strictly and properly comply with the Technical Guidelines for Compensation and Resettlement (November 2005). These regulations include articles specific to ethnic communities (Articles 17 and 18). (Institute Environmental and Social Division (IESD). (Institute Environmental and Social Division [IESD]. (2009). Environmental and social operations manual for road sector. Vientiane, Lao PDR: The Public Works and Transport Institute [PTI] and Department of Roads).

2.10 International Environmental Agreements

The Government is party to various international treaties and conventions that are relevant to environmental protection (Appendix B). These conventions and treaties pertain to biodiversity, social development and protection of significant cultural resources and commit the Government to meeting a number of obligations. However, the process and method for implementing obligations contained in international conventions and treaties to which Lao PDR is a party are not clearly spelled out in domestic law. The Ministry of Justice is currently developing provisions for regulating the ratification of treaties as a dual system. Currently, it is understood that when the Government adopts an international convention, the legal system must conform to the provisions of the treaty and its provisions must be incorporated into domestic legislation. The National Assembly has enacted specific laws relative to their obligations under various international conventions.

Among the most important conventions, the most relevant are:

The United Nations Convention on Biological Diversity (UNCBD) ratified by Lao PDR on September 20th 1996. The convention imposes a number of obligations including: to establish protected areas; to develop guidelines to manage those areas; to identify and monitor components

of biological diversity; and to assess the environmental impact of proposed projects which may have adverse impacts on biological diversity. Being a party to this convention further reinforces the obligations Lao PDR committed to in July 1985 under the ASEAN Agreement on the Conservation of Nature and Natural Resources, which covered most of the basic components of the UNCBD. Several key pieces of legislation were enacted to meet Lao PDR's obligations under the UNCBD, including Decree 164 (1993) relating to the establishment of National Protected Areas (NPA); the EPL (1999); and the Regulations on the Management of the NPA, Aquatic and Wild Animals (2001).

United Nations Framework Convention on Climate Change (UNFCC) ratified by Lao PDR in January 1995. Under the UNFCC the Government is responsible for ensuring that future development in the country meets various conditions of the convention. In the case of proposed road projects, relevant issues include the potential for deforestation and therefore reduction of sinks and reservoirs of greenhouse gases, increase in traffic and generation of greenhouse gases, and the need to climate-proof design and assess possible impacts of climate change on road development.

Convention on the Protection of the World's Cultural and Natural Heritage ratified by Lao PDR in March 1987. This convention aims at the protection and conservation of the world's cultural and natural heritage including habitats of threatened animal and plant species, and sites of outstanding cultural value. The MIC is responsible for implementing this Convention project. (Institute Environmental and Social Division [IESD]. (2009). Environmental and social operations manual for road sector. Vientiane, Lao PDR: The Public Works and Transport Institute [PTI] and Department of Roads).

2.11 The Road Law

The Road Law (1999) establishes the powers and responsibilities of various agencies for road planning, design, construction, and maintenance at the national, provincial, district, municipal, and village levels. The Road Law also provides the framework for setting technical standards and requirements. In relation to environmental management, Article 15 requires that road construction shall be undertaken in accordance with public safety and environmental

protection considerations. This clearly requires environmental protection during road construction and imposes duties to monitor environmental impacts on MPWT and local government agencies. Article 31 gives the ministry in charge of roads the power and function to "set up the organization, management, control, planning, survey, design, construction, maintenance, repair, and use procedure of the road throughout the country." (Institute Environmental and Social Division [IESD]. (2009). Environmental and social operations manual for road sector. Vientiane, Lao PDR: The Public Works and Transport Institute [PTI] and Department of Roads)

2.12 Regulations on Environmental Impact Assessment of Road Projects

The Regulations on Environmental Impact Assessment of Road Projects (EIARP) apply to all stages of a road project. Therefore the EIARP is to be used by all parties involved with road construction, management and maintenance activities.

These regulations for road projects define responsibilities and procedures for the implementation of the EIA Regulations concerning the issuance and enforcement of ECC for individual projects and are intended to: (i) provide meaningful opportunities for public review of potential environmental impacts of projects; (ii) ensure that all projects are implemented in line with the sustainable development policy of the Lao PDR; (iii) ensure that all foreseeable impacts on the environment, including cumulative effects, are fully considered prior to any irrevocable commitments of resources or funds; (iv) ensure that all feasible alternatives are considered; (v) ensure that all feasible means to avoid or mitigate damage to the environment are implemented; and (vi) help strengthen local institutions in environmental decision making, implementation, and monitoring.

According to MPWT, the EIARP is to be considered standard operating practice for all road development and management activities. MPWT has developed this ESOM describing the environmental principles and guidelines applicable to road construction (including rehabilitation), management, and maintenance on the basis of the EIA Regulations and the EIARP.

An EIA for a road project includes: (i) description of the project activities to be carried out; (ii) potential negative and positive environmental impacts for each activity; (iii) proposed mitigation and/or enhancement measures; (iv) consultation, public participation and co-ordination

with other government agencies; (v) socio-economic and cultural considerations; (vi) the budget for mitigation measures; (vii) supervision requirements; and (viii) monitoring and evaluation requirements.

The EIARP requires that all environmental considerations must be included in all tender and contractual documents. In addition, they require that provision for corrective actions and/or mitigation measures be incorporated into the construction, supervision, operations, and maintenance stages of a project, and provide a checklist of such potential impacts and mitigations measures for each of these stages.

The project owner is responsible for monitoring the environmental impacts of its project and for reporting regularly to the line ministry and the environmental agency (WREA). Environmental monitoring is referenced in the EIA Regulations which state that monitoring compliance with the EMP is a joint mandate of WREA and the line ministry. Article 15 of the EIARP confirms this arrangement whereby the "road project owner shall ensure that the contractor correctly implements the EMP and provides progress reports to MPWT and WREA on a regular basis." This authority gives the WREA and MPWT the right to enter project sites, with or without prior notification, in order to; (i) ensure compliance with the terms of an EMP; (ii) make visual inspections and spot checks; (iii) interview employees, occupants, or other persons on site; and (iv) collect samples, inspect and take copies of relevant data or documents, and take all other measures necessary to control impacts on the environment. The respective roles of WREA and MPWT are referred to as a joint mandate.

In addition, environment-related provisions of sector laws mandate agencies the power to adopt procedures and rules to implement laws and enforce regulations on a broad range of activities relating to the construction of roads such as: extraction from, and conservation of, forests; mining and quarrying; designation and protection of monuments and sites of cultural and historic interest; designation and protection of areas of special scenic beauty or biodiversity; preservation of parks and sanctuaries; control of noise pollution; conservation and protection of water resources (including lakes, springs, streams, and rivers); protection of community forests; prevention of illegal encroachment on land or into forests; and protection and preservation of sacred sites that are not already under the custody of a monastic body or central agencies. (Institute Environmental and Social Division [IESD]. (2009). Environmental and social

operations manual for road sector. Vientiane, Lao PDR: The Public Works and Transport Institute [PTI] and Department of Roads).

2.13 Information about Rehabilitation of the National Road 13 N Project

Rehabilitation of the National Road 13 N from Xai District to Namo District in Oudomxai Province includes expanding the road width to 7-meters paved with asphaltic concrete from an existing road width of 5-meters, covering total length of 78 kilometers. The project is aimed at rehabilitating road sections that are normally subjected to flooding and landslides during the rainy season in order to improve transportation networks by reducing the aforementioned natural disaster risks, reducing travel time along the road, boosting economic development and supporting trade along the economic corridor. This section of the National Road passes through 23 villages in two districts of Oudomxai Province. The geographic characteristic of this road is mostly mountainous; with an elevation from 300 to 1,850 meters above sea level (Environmental Inventory, March 2000). But the rehabilitation of the National Road 13N Projects has not conducted EIA/EMP before rehabilitation of this project or this project has overlooked the EIA Lao PDR regulation for developing and approving[5]. The EIA/EMP did not calculate the social and environmental impacts of rehabilitation of the National Road 13N Project to communities and the natural environment. The study identified the potential impacts of this project only.

This project has not calculated social and environmental impacts in the Total cost for rehabilitation of the National Road 13 N from Xai District to Namo District. Comprise 23 villages, 3,211 households and 19,195 people living along 78 km length. All these costs will be estimated and included in the analysis section of this thesis as an output of the current EIA study.

[5]The by passing of the EIA Regulation (both of WREA and the Department of Roads) has important implications for the future of the EIA as effective tools for social equity, environmental protection, and sustainable development in the Lao PDR.

CHAPTER 3

RESEARCH MATERIALS AND METHODS

3.1 Study Site

National Road 13 N starts from the capital of Xai District, where an intersection with Road 2E (Oudomxai to Khoua District, Phongsaly) exists at kilometer 0+000 near the Singthong hotel. The end point of National Road 13 N is at Ban Nahom in Namo District, and this is a border point between Oudomxai province and Namtha province.

Target sample groups for this study are at villages and communities present along a 78 kilometers section of National Road 13 N, from the center of the capital Xai District to Namo District in Oudomxai Province (23 villages in two districts: 9 villages in Xai District and 14 villages in Namo District). The total population of these 23 villages as: Navanhnoi; Vanghai; Homsouk; lak4; 5).Homxai; Lak10; Kornoi; Huayta; Lak22; Nambortakai; Kulong; kiewchap; Nathong; Namveuntai; Huayon; Homxai; Namsea; Natong; Namotai; Pangdou; Tungthong; Nampheng; and Nahom, is 19,195 people divided into 3,211 households (Census, 2008). The route of this section on Rehabilitation of the National Road 13N is shown in Figure 3.1&3.2.

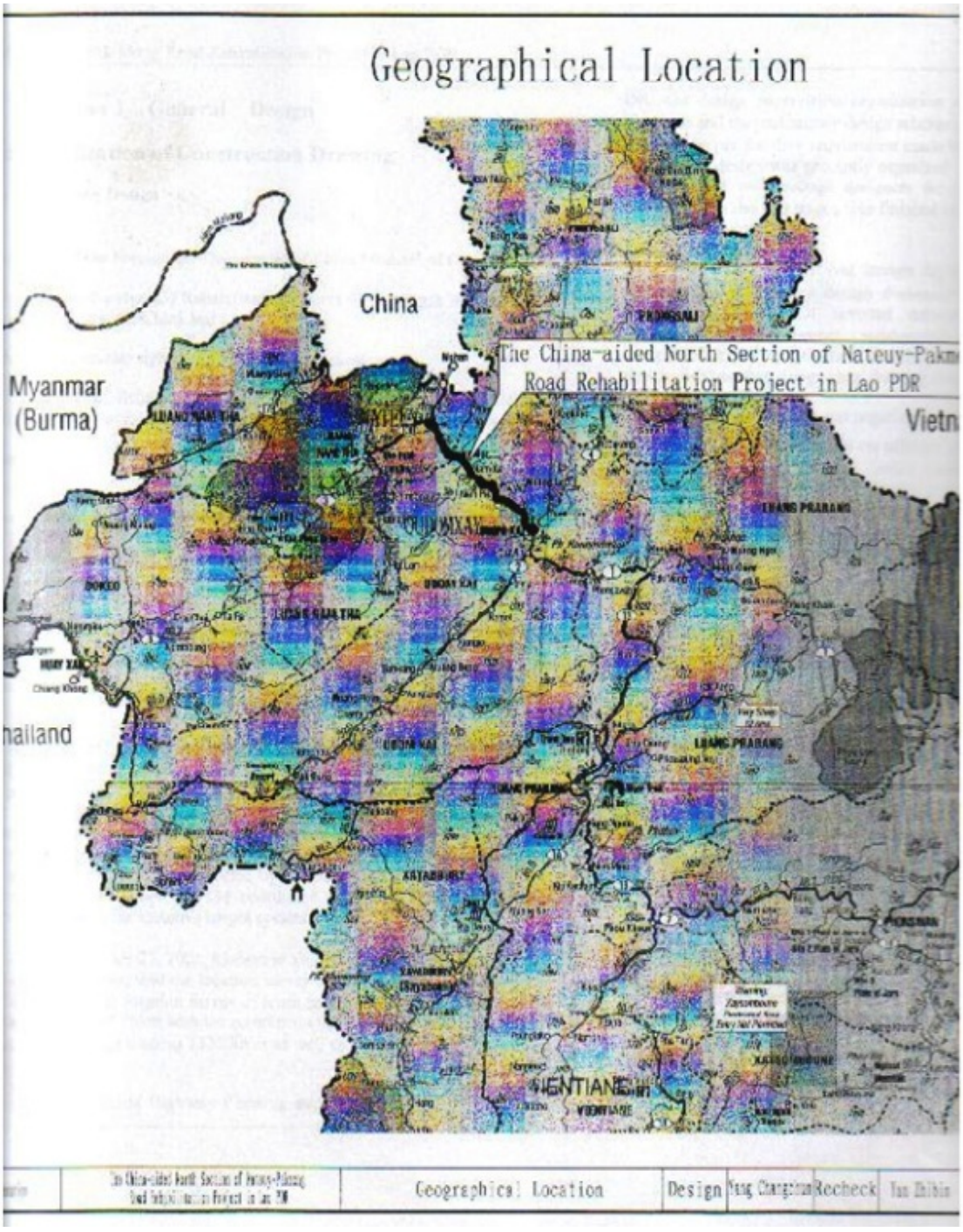
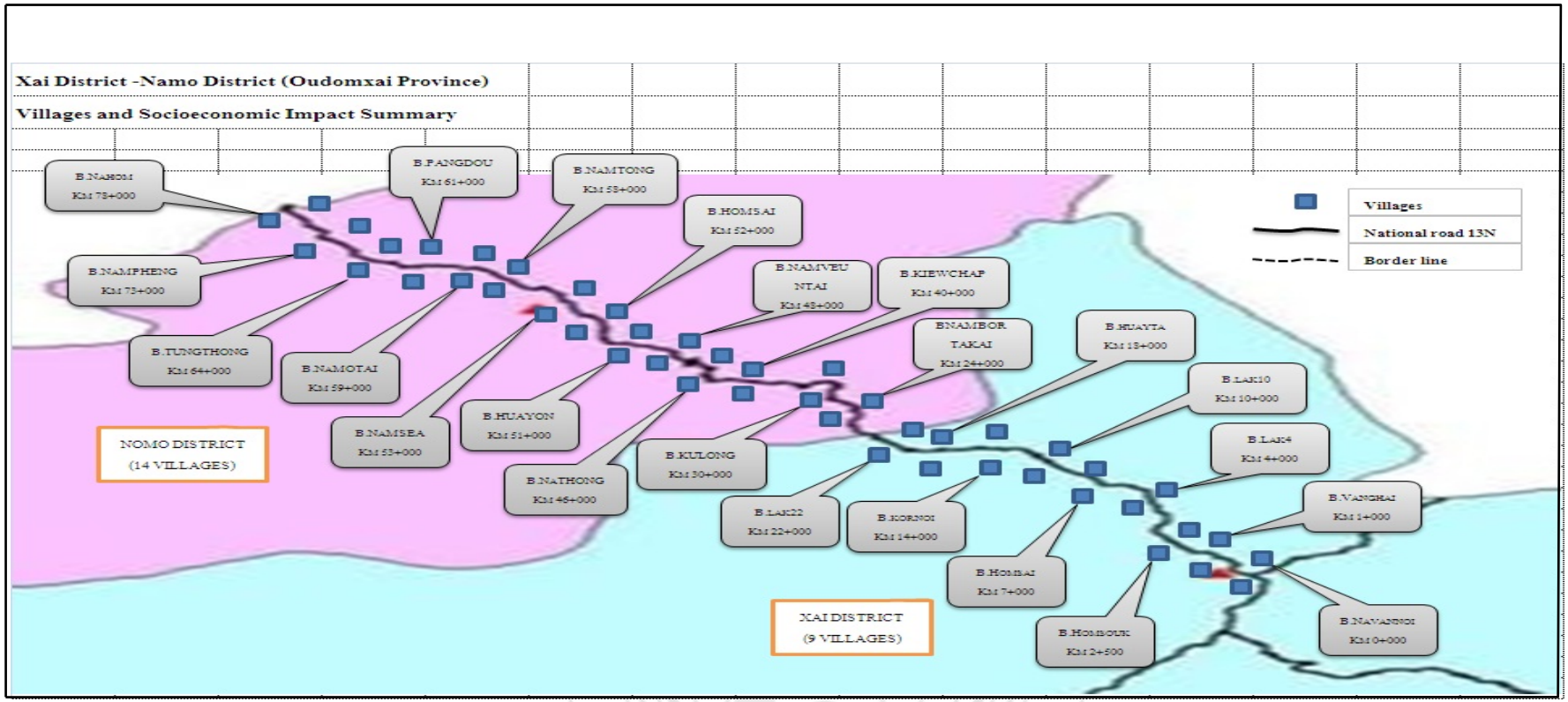


Figure 3.1 Geographical Location of Proposed National Road13N/78 kms from Xai to Namo Districts, Oudomxai, Northern, Lao PDR.



From The China-aided North Section of Nateuy-Pakmong Road Rehabilitation Project in Lao PDR (Section 1), October, 2009

Figure 3.2 Study area and 23 villages along the rehabilitation of the National Road 13N from Xai district to Namo district, Oudomxai Province, Laos

All of these twenty-three villages had moved to the roadside for more than 30 years, majority of the population living along the national road included three ethnic groups such as Khmu, Hmong and Laolum. At the time of this investigation, the national road 13 N from Xai district to Namo district had a bad surface and was in poor condition. The Lao government had received funds from the PRC for the new road rehabilitating and had started the project from year January 2009.

3.2 Households Survey Method

Household survey was used to obtain an appropriate amount of information from a large number of subjects. The questionnaires should be tested through administering (testing the questionnaire) to small groups to determine their usefulness and reliability then corrected if necessary, and tried again. The aim of the survey method is to describe and explain statistically the variability of certain features of the population. Because of the strengths of the survey method, they provide accuracy and convenience for extracting information to be amenable to rapid statistical analysis and are comparatively easy to administer and manage (Marshall & Rossman, 1999).

In this survey, the simple random sampling method assumes that every household has an equal and independent chance of being chosen for the survey. In theory, this simple random sampling method requires selection with replacement, but samples in survey research will generally be comparatively small in contrast with the number of elements potentially available for sampling. Then the effect of non-replacement will be trivial and need not be considered further (Schofield, 1996).

3.3 Data Collection Method

Mostly, the research approach is to identify the socio-economic and environmental impacts by using a specially designed questionnaire for interviewing people at project sites specifically people who received impacts from the rehabilitation of the national road 13 N.

This household questionnaire had four parts: background information (household profile), socio-economic and environment data and income and expenditures. Details are shown in Table 3.1

Table 3.1 Data collection method

Part	Content
Part 1	Basic household information: This includes the registration number, location, material uses. (This information was used to classify the household classification in terms of impacts) This part also consists of the numbers of people in the house, detail of family work habits and other information on productive labor, land ownership, history of villagers 'settlements, and how they see changes in available natural resources in this period compared to the period before rehabilitating
Part 2	Information on health: This part aims to gather data before and after the start of the project on common diseases, infant mortality, sickness treatment as well as their sanitation issues in the village and the burden of these services during the project life.
Part 3	Information on socioeconomic and environment: This section starts by asking about the background living before the project start, the impact in general, like their observations on physical, social on changes. It also consists of villagers' expectations about outsiders' support in terms of environment. The general environmental information follows by field physical and social data collection and feedback opinion of inhabitants will be used for the proposed mitigation measures
Part 4	Income and expenditures: The objective of this part is to find out main incomes and expenditures of different groups within each village before and after the project start. The questions will help to determine their sources of income and the main items that they have to spend for. Answers not only help us to understand the economic situation here but also give us a social perspective in terms of their livelihood options and a possible intervention

The field survey time is the first household survey was carried out during 10 – 30 June 2009. The second survey was carried out during 1–30 July 2010 and the third survey was carried out during 5-28 August 2010. In each village, key informants and local leaders were met, including the village headman and deputy headman. This interview focused on the household head and his/her spouse especially project impacted people. The survey was conducted in Lao language without translation, because all villagers are Lao (Laolum, Hmong and Khmu) minority groups and use the Lao language for communicating. Before the interview started, the researcher introduced and explained the objective of the study and convinced each family to cooperate.

3.3.1 Data Collection

Data collection was carried out with the cooperation of the Oudomxai Department of Public Works and Transport (DPWT), Oudomxai Department for Planning and Investment (DPI), Water Resources and Environment Administration (WREA), Ministry of Public Works and Transport (MPWT) and the Administration Office of Xai and Namo Districts, Oudomxai Province, Lao PDR.

Data were collected from two sources: primary data and secondary data.

3.3.2 Primary Data

Primary data collected from:

3.3.2.1 Field Observations

Before field survey started the researcher visited and observed many (twenty-three) villages in this project areas during May, 2009 with staff of each organization's committee (including staff of DPTW,SED,DPI), staff of both districts, each village authorities and employee especially People Involvement (PI) team. The result of this field visit and observation provided researcher with better understanding of the field work and these villages situation.

3.3.2.2 Field Survey

The field survey was designed to collect data and interview involved people working in SED (Oudomxai Social and Environmental Division) and village authorities. (headmen, deputy headmen, group discussions and individual household interviews)

The total number of households interviewed in this research focused on the communities in the 23 villages located in two Districts. (Xai District and Namo District)

There are 19,195 people in 3,211 households at the 23 villages. The sample size of respondents was based on the application of the Yamane formula (Taro Yamane, 1973) and calculated to be 356 households.

The sampling was estimated by the following formulation

$$n = \frac{N}{1 + Ne^2}$$

Where: n : Sample size

N : Population size

e : Level of precision

(0.05 significant levels)

Thus, with 3,211 households in the target village, the sample size was calculated as follows:

$$n = \frac{3,211}{\{1 + 3,211(0.05)^2\}} = 356$$

The same formal was used to calculate the number of households interviewed in each of the 23 villages.

$$n = \frac{N}{1 + Ne^2}$$

Where: n_i: Number of sample in each village

n: Number of sample in commune

N: Total number households of two sample commune

N_i: Households of each village

Initially all the village households were appraisal targets but formula above shows that the actual numbers of interviewed households acceptable by this particular formula. Profiles of the interviewed households are presented in 356 HHs; thesis research will focus on actual impacts only. Therefore from actual interviewing in site among months (June-September, 2010), the research can found only 106 local HHs got impacted from this project or the project impacted

only 106 local HHs. Hence the detail actual impacts of the thesis research will be explained in Table 4.1 in Chapter 4.

Therefore, 106HHs impacted from 356 HHs interviewed and could be calculated by:

$$\text{Percent Impacted HHS by the National Road Project} = \frac{n1xN}{n}$$

Where: n1: Negatively impacted HHs (106)

N: Total HHS (3,211)

n: HHs was selected from sampled (356)

$$\text{Total Estimated Costs to PAPs} = \left[\frac{(N)}{n} \times (Costs)\right]$$

Where: N: Total HHS (3,211)

n: HHs was selected from sampled (356)

Costs mean: Calculation of the impacts (such: losing houses, shops…) that had been caused by this project.

The questionnaire was designed for twenty-three villages and focused on attitudes relating to impacts from Rehabilitation of the national Road 13N between Xai District to Namo District and comprised three parts: (1) General Household information (income, member, occupation of impact), (2) impacts from rehabilitation of the national road including positive impacts (job, income, facilities) and negative impacts (loss of physical assets, current use of land, job, income, agricultural products), (3) the feedback opinion of the villagers.

Qualitative analyses can be extremely useful for exploring the determinants of successful collective action, but a lot of preparatory fieldwork must be done up front in order to identify collective action outcomes and indicators of cooperative capacity that truly reflect the real-world situation and are comparable across the population under consideration. Careful thought must also be given to issues of endogenous impacts and thus what information can be collected that would enable researchers to create instrumental variables that can be used in place of potentially endogenous variables (Meinzen-Dick al., 2004)

3.3.2.3 Group Discussions

Every village after household-by-household interviews, held a meeting with some villagers participating especially the villages had project impacted (both persons interviewed and not interviewed) and district staff to discuss and tell about their problems from this project. The results of discussion were carefully noted and all of the above will explain in Chapter 4 on analysis and result.

3.3.3 Secondary Data Collection

Secondary data majority were collected from DWPT (Oudomxai Department of Public Works and Transport), MPWT (Ministry of Public Works and Transport), WREA (Water Resources and Environment Administration), Department of agriculture, Ministry of Finance, MAF (Ministry of Agriculture and Forestry), and DPI (Oudomxai Department for Planning and Investment).

3.4 Data Analysis and Interpretation

The field survey data were checked and entered into a computer and then analyzed and interpreted by using program EXCEL office 2007 and Statistic Package for the Social Sciences (SPPS) version 16.0. Data were analyzed by descriptive statistics of order and frequency and the main presentation of analysis focuses on the frequency table which provides the number of respondents and percentage belonging to each of the categories for the variable in question. The bar chart is used to illustrate main reasons and the pie chart is used to show the relative size of the different categories to highlight the size of each slice relative to the total sample.

The result of water quality analysis was compared with the current Lao PDR standard to see the socioeconomic and environment of the scope of EIA that is currently being used by the Lao EIA regulation, and then find out the suitable solution for such particular problems.

Table 3.2 Data Requirement and Activities to Collect Data

Research questions	Data requirement activities	Methodologies	References	Results
1. What are the impacts to the environment (physical and natural resources)?	-Information about environmental impacts on rehabilitation of the National road 13N from Xai district to Namo district along 78 km, focus on twenty-three villages: -Loss roadside water supply -Loss of riverside vegetation -Loss of forest resources -Depletion of natural resources and food for road workers -Atmosphere (air quality) -Soil impact, -Noise/Vibration impact	-Field observation for the stakeholder (workers) such as: their housing camps, water supply, toilets, kitchens along the road sited -Use questionnaires to interview targeted households -Group discussion with village authorities meet with villagers discussion by using Participatory Rural Appraisal (PRA)	-Local people especially those who got impact from Project -Head of PWT office and each villager -Related documents and reports	-Identify a list of physical and natural resources impacts and appropriate mitigation measures scheme
2. What are the impact to communities (loss of houses, garden land, shops and structures)?	-Information about socio- economic (loss of houses, shops, garden land and structures) impacts on rehabi-litation of the National road 13N from Xai district to Namo district along 78 km, focus on twenty-three villages. -Number of households got impact	-Field Observation -Use questionnaires to interview target households and record the interviewee said or get impact from this project. -Group discussion with village authorities meeting with villagers discussion to determine their compensation demands	-Local people especially those who got what impact from Project -Head of each villager -Laos EIA regulation and Laos Law on the compensation and Resettlement Action Plan (RAP)	-Identify on fair compensatio to the project impacted -Helping Lao people to under-stand and EIA regulation can help them and make lesson learn for the National Road projects in future.

Table 3.2 (continued)

Research questions	Data requirement activities	Methodologies	References	Results
	-Fair compensation or not fair compensation -Education level of local villagers -Land each household got impact - Lao's people human right on the Laos Law or land Law			
3. What are the estimated costs of these social and environmental impacts?	-Number of households impacts at each villages along the rehabili- tation of the national road 13 N from Xai district to Namo district. -Number of all actual impact to people for analyzing and calculating by compare unit cost from project best practices done in Laos under Laos Law.	-Use standards for calculating from successful case from other land and structures places that are applicable to this particular case through literature review, study tour, etc. -Use questionnaires to interview target households. -Compare between unit cost with other project had done	-Local people had impacted (loss of houses, shops, agricul- tural etc) -Head of each villager. -Experts of relevant research	-Find out justices to the Lao's community living along 78 km rout in both Districts, Oudomxai Province -To take into account of this project.

Table 3.2 (continued)

Research questions	Data requirement activities	Methodologies	References	Results
4. What are the appropriate mitigation measures to reduce the negative impacts from the rehabilitation of the National Road 13 N?	-Socio-economic and environmental impacts each aspects -List of the socio-economic and environmental lost issues and items.	-Find out some successful case from other places that can be applicable to this particular case by literature review, study tour, etc -Conduct group discussion in order to make sure that the community can get involved in the decision making process and can accept proposed mitigation measures.	-Experts of relevant research -Related documents and reports.	-To reduce the negative impacts from the rehabilitation of the National Road 13N on social and environment.
5. What are the total costs of National Road 13N for the 78 kms section being studied?	-Social and environmental cost estimate from calculation in question four will be added to the total cost of this project (Secondary data), originally.	-Review contract documents of the project. -To calculate costs from actual impacts from interview data. -Use standards for calculation.	-Local people had got impact from this project. -Number of all house holds had got impact.	-Actual total cost from this project.

CHAPTER 4

CASE STUDY RESULTS AND ANALYSIS

Sampling for this thesis research consisted of 356 households selected for structured interviews according to the Yamane formula (Taro Yamane, 1973). From visual inspections and the interviews, it was determined that the actual project impacted only 106 local HHs (numbers assessed from interviews during June to September 2010). The thesis research thus analyzed only the information obtained from 106 households, and did not cover the other 250 HHs considered statistically significant for analysis of sampling results. All other households sampled claimed that they did not receive impacts from the road project (information obtained from interviewing the head of each village and interviewees or project impacted persons from June to September 2010).

The project impacted 106 HHs as described in Table 4.2 Number of Impacts of Both Environmental and Social Aspects. Some 106 households had to move houses back and/or remove tiled roofs (one-storey houses); two (2 houses were demolished); twelve (12) households lost temporary bamboo fence (172 meters in length) and eight (8) households lost permanent fences made of by concrete (average approximately 60m^3); many households lost vegetable gardens (approximately 2.0 ha or 20,000 m^2) loss of 56 shops (average approximately 525 m^2) ,and loss of 10 electricity poles along the route from km 18 to 70.

Table 4.1 Results of Impacted Households Used for Interviewing

No	District/Village	Location (km)	Total HHs	Sampled HHs	Negatively impacted HHs
I.	Xai				
1	B.Navanhnoi	0+000	237	26	0
2	B.Vanghai	1+000	250	28	0
3	B. Homsouk	2+500	352	39	5
4	B. Lak4	4+000	215	24	2
5	B. Homxai	7+000	139	15	8
6	B. Lak10	10+000	107	12	4
7	B. Kornoi	14+000	204	23	9
8	B. Huayta	18+000	86	10	3
9	B. Lak22	22+000	61	7	0
II.	Namo				
10	B. Nambortakai	24+000	55	6	6
11	B. Kulong	30+000	67	7	6
12	B. Kiewchap	40+000	69	8	3
13	B. Nathong	46+000	132	15	3
14	B. Namveuntai	48+000	88	10	5
15	B. Huayon	51+000	285	32	17
16	B. Homxai	52+000	242	27	8
17	B. Namsea	53+000	100	11	6
18	B. Natong	58+000	55	6	9
19	B. Namotai	59+000	78	9	3
20	B. Pangdou	61+000	64	7	0
21	B. Tungthong	64+000	145	16	0
22	B. Nampheng	73+000	68	8	2
23	B. Nahom	78+000	112	12	4
Total	**23**	**78**	**3,211**	**356**	**106**

Note. 1. The zero (0) represents households that were not impacted

2. Data obtained from Interview Households, June-September 2010

Initially all the village households were appraisal targets but the formula above shows that the actual numbers of acceptable interviewed households by this particular formula was 356 HHs.

However, due to the fact that this thesis research focused on actual impacts only, that is HHs that were negatively impacted by the rehabilitated road project, only 106 HHs were interviewed in depth as 106/356 HHs were found to be negatively impacted from actual interviewing in site among months (June-September 2010). Hence the detailed actual impacts of the thesis research focused on the interview results of 106/356 HHs.

Table 4.2 Resulting Number of Impacts of both Environmental and Social Aspects

District/village	Affected HHs and Hs	Affected Wood Hs with tiles or zinc	Affected shops	Affected crops	Affected electricity poles	Affected water pipes	Remarks (km)
Xai							
B. Homsouk	5		5				
B. Lak4	3	2	1				
B. Homxai	8	2	6				
B. Lak10	5					60	meters long
B. Kornoi	9	3	6				
B. Huayta	3		2		1		
Namo							
B. Nambortakai	6	2	3		1		
B. Kulong	6	3	2	0.2ha			Rubber trees
B. Kiewchap	3		2		1		
B. Nathong	3	1	2				
B. Namveuntai	5			1.2ha			Corns garden
B. Huayon	17	3	12		2		
B. Homxai	9	3	4		2		
B. Namsea	6		5		1		
B. Natong	9						
B. Namotai	3		1		2		
B. Nampheng	2		2				
B. Nahom	4	1	3	0.6ha			Khar garden
Total	**106**	**21**	**56**	**2**	**10**	**60**	

Note. Data from interviews, Head of each villages and Deputy Director Lao Party of this project from June to September 2010.

Table 4.2 In above is shown for all of the villages and households received actual impacted from the rehabilitation of the National Road 13N Project.

4.1 Baseline Information on Interviewed Households

4.1.1 Information of HH Respondents

From the 106 local households interviewed, most interviewees (70) were household heads (mostly men) who seemed to know better the conditions within their households and were able to explain and compare the periods before, during and after completion of the rehabilitation project; however, housewives (36) were also important in providing some specific data, especially about monetary expenses, income generation, etc.

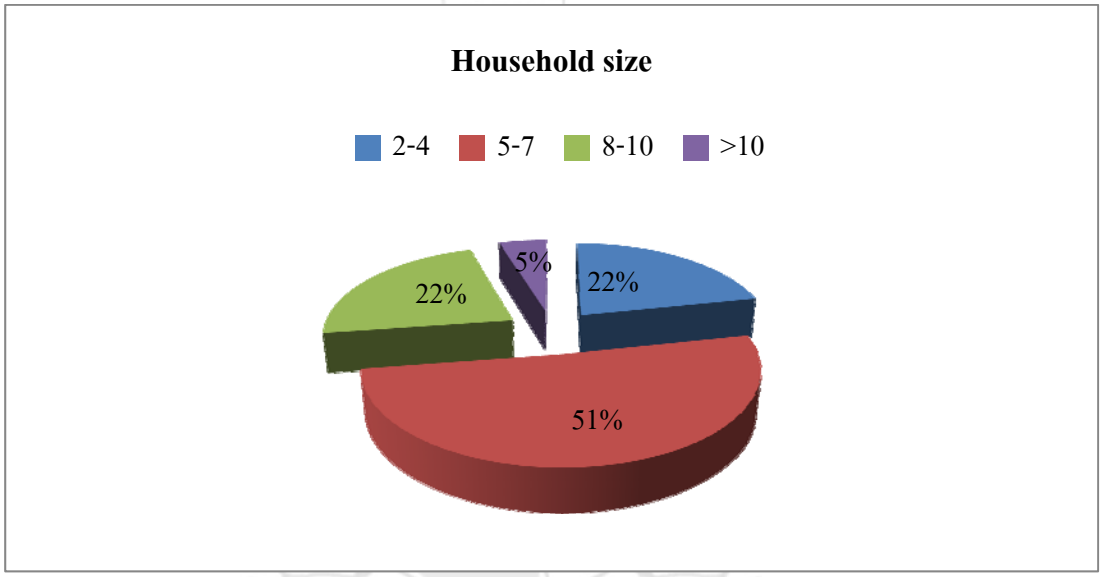
According to the results of the households interviewed, almost all households (106 households) were reportedly dissatisfied with each impact from the project, and only 35 households were satisfied. Most households (71 households, or 67%) felt that they were misinformed, tricked, or lied to with false information from the district staff, stakeholders who talked with them, or organizations who would be responsible for compensating them for their loss. The majority of affected people have yet to receive anything from this project.

4.1.2 Household size

During the interviewing, based on household information gathered by questionnaires, the sizes of households ranged from 2 to 10 people in the 106 sample households (comprised of households affected by the rehabilitation project), with 646 people (328 male, 318 female) in total, and an average household size of 6.09 members. Under Lao tradition, married children still live with their parents in order to take care of them, thus explaining why average household size is a bit large. However, medium size households accounts for the single highest percentage. Details are shown in Table 4.3 and Figure 4.1. Household Size of Respondents percent

Table 4.3 Household Size of Respondents

Household Type	Family Members	No. of Respondents	Sampling percent (%)
Small size	2-4	23	22
Medium size	5-7	54	51
Large extended family	8-10	24	22
	>10	5	5
Total	**-**	**106**	**100**



Note. Data from interviewing each Village June to September, 2010

Figure 4.1 Household Size of Respondents percent

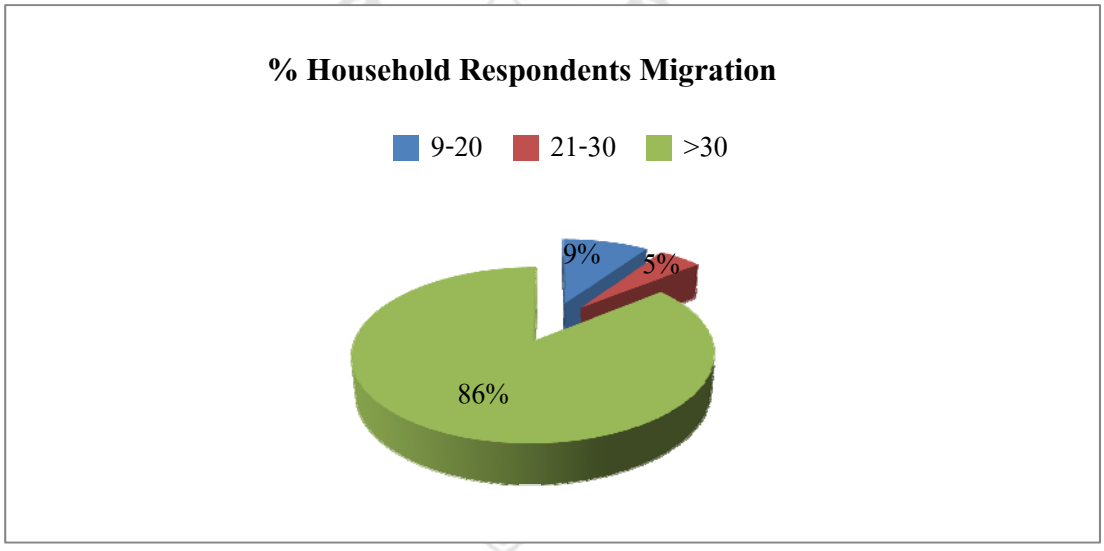
4.1.3 Migration

The majority of the interviewees (97 households, 91.5%) are native to their area of living and the rest (9 households, 8.5%) moved from outside, but all respondents have lived in their present homes for at least 9 years. The duration that villagers have settled in these villages (18 villages) were divided into three periods. Details are shown in Table4.4 and Figure 4.2. Those

living here less than 20 years are considered as outsiders, although all respondents were living in their villages for at least a period of 9 years. The residents considered those who have living here longer than 20 years or those who have their birthplaces in the village as local citizens. However, 85.85% of respondents have lived in the village more than 30 years (Interviewees).

Table 4.4 Household Respondents Migration

Duration of living in village, years	No. of Respondents	Sampling percent (%)
9-20	10	9
21-30	5	5
>30	91	86
Total	**106**	**100**



Note. Data from interviewing each Village June to September, 2010

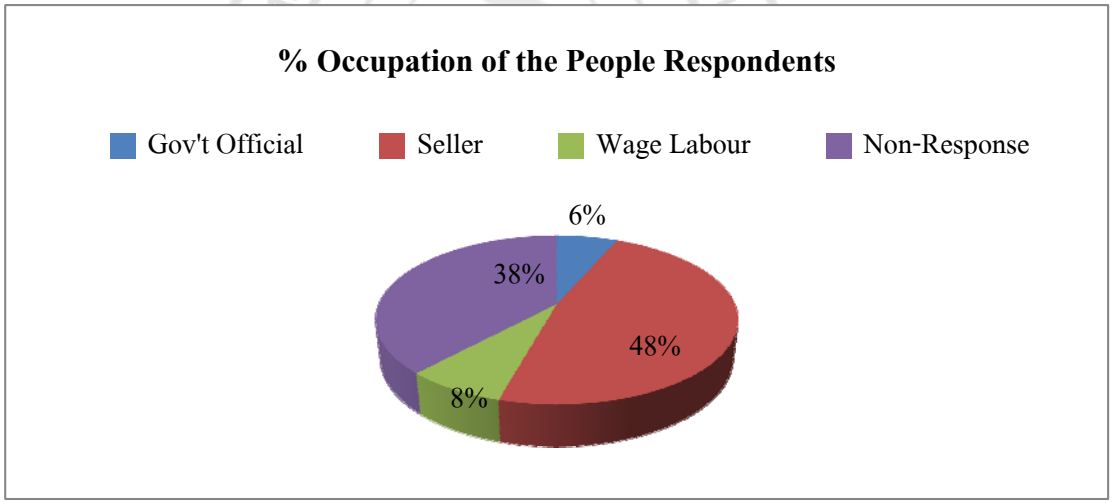
Figure 4.2 Household Respondents Migration percent

4.1.4 Occupation

Almost all households' respondents have the main occupation as a farmer in paddy rice fields, lowland and upland rice fields, dry season vegetable gardening, and/or livestock rising. These crops are all used for food security and cash income with some households also selling their crops such as cucumber, mushroom, and bananas. The detail occupation is presented in Table 4.5 and Figure 4.3:

Table 4.5 Occupation of the People Respondents

Occupation	No. of People	Sampling percent (%)
Gov't Official	30	6
Seller (Agricultural products)	315	48
Wage Labour	50	8
Non-Response (children, elders)	251	38
Total	**106**	**100**



Note. Data from interviewing each village on June to September, 2010

Figure 4.3 Occupation of the People Respondents percent

4.1.5 Agriculture Activities

Agriculture activities include farm work and livestock husbandry. Although these form the overall main livelihood activities of households, they are not the only source of income. Thus, in determining the rank of the livelihood activities we cannot base activities solely on income, but rather on the extent of participation of households in each activity. In light of this, agriculture, particularly shifting cultivation, is the single most important source of cultivated food source. Estimating the exact income of each crop composition is difficult since the villagers harvest similar crops at different times of the year.

According to discussions with the villagers and our observations in the field, taking into account the district's topography, we divided the main agriculture livelihood activities into three components (upland field cultivation, lowland field cultivation and livestock husbandry).

4.1.5.1 Upland and Lowland Field Cultivation

Shifting cultivation is the traditional farming method and is applied to all crops grown on slope lands. No fertilizers are applied on upland fields, nor are these lands ploughed. The upland fields have no irrigation system, and thus are heavily dependent on natural rainfall. Crops on these fields are regularly damaged by wild animals and insects, often limiting productivity. Mostly, villagers plant maize and galanga (Khar) on, upland rice fields, and rubber, beans, and cassava on upland fields.

Each household possesses up to 1 ha of upland and lowland fields, but in particular size of land outlived depends on the capacity of household in terms of labour. If one household has a large labour force they are more likely to be able to expand their land area. For the three lower poverty groups (well-off, medium and poor), livelihoods are based mainly on upland agriculture activities, significantly more than the dependency of well-off group on upland activities.

Activities in the lowlands mainly comprise paddy rice cultivation. Approximately 372 ha (with an average of 8.6% and 13% in Xai and Namo Districts, respectively) of natural land is used for paddy rice. This is a small number if compared to the whole area. The areas used for lowland and upland paddy rice of each village before rehabilitation is presented in more detail in Table 4.6

Table 4.6 Paddy Rice Area of Each Village in Two Districts

Item	District/Village	Unit	Hectare	Remarks
I.	**Xai District**			
1	Homsouk	ha	23	
2	Lak 4	ha	22	
3	Homxai	ha	20	
4	Lak 10	ha	20	
5	Kornoi	ha	25	
6	Huayta	ha	19	
	Sub-total	**ha**	**129**	
II.	**Namo District**			
7	Nambortakai	ha	18	
8	Kulong	ha	19	
9	Kiewchap	ha	19	
10	Nathong	ha	22	
11	Namveuntai	ha	19	
12	Huayon	ha	24	
13	Homxai	ha	23	
14	Namsea	ha	21	
15	Natong	ha	22	
16	Namotai	ha	19	
17	Nampheng	ha	19	
18	Nahom	ha	18	
	Sub-total	**ha**	**243**	
	Grand Total	**ha**	**372**	

Note. Data from two districts and Head of villages each village, 2010

For upland and lowland cultivation did not impacts from national road rehabilitation due to this project followed existing alignment along 78 kilometers.

4.1.5.2 Livestock Husbandry

Generally, three animal species are bred: cow, pig, and chicken. Cows do not appear numerous. Villagers reported that this owed to their lack of capital to breed and take care of cows. Moreover, villagers felt that they do not have the necessary skills and knowledge to effectively manage livestock for economic purposes. Villagers generally leave their cattle in the common pastures to graze, which has lead to problems in the past, specifically in the flood event of 26 September 2008, when many cattle drifted away or drowned.

As many as 70-80 % of cows and pigs are sold to outsiders (through middlemen) and not used for household consumption. This trade is generally carried out by the well-off groups who have a lot of livestock. Chickens are generally used for subsistence consumption. The poor households generally only have a few livestock and use them mostly for consumption.

4.1.6 Wage Labour

Wage labour does not form a major income source for households in this area. Only in the harvesting seasons, when there is demand for labour in crop harvesting activities, do households hire labour from their village. On average labour wages amount to $4-$5 per day, per person or 500,000kip/month per person in 66 household (in the case of workers in house and road construction projects). In some cases arrangements are made whereby labour is exchanged among neighborhoods. Such arrangements are common and do not involve a financial transaction. In some exceptional cases, a well-off household may employ the poor to carry out labour tasks regularly, especially farming work.

4.1.7 Trading

Trading in both districts is usually conducted by people who operate grocery shops; they sell daily needed goods to villagers along the National Road side, and also play a role as middleman to buy agriculture products and NTFPs from villagers. The villagers can buy on credit and at the end of each harvest; they harvest and return their loan in the form of crops. Such financial arrangements are made between villagers and shop owners, whereby the arrangement implicitly bounds the villager to do trading exclusively with that grocery shop. Interestingly,

some of these shops are also the places where illegal wild animals and illegal timber are stored before further trade to outside the district.

Some local people also do their business as middleman in their own village; they collect NTFPs from villages and sell to traders. They mostly have the contract with their village with some conditions, where they have to pay taxes to the village fund based on the amount of products; in contrast, they have the right to collect the products and villagers are not allowed to sell to other middlemen to ensure a stable supply of raw materials.

4.1.8 Income from NTFPs

The main NTFPs at surveyed villages are rattan, bamboo, incense bark, broom reed, bitter bamboo shoots, mushrooms, wild vegetables, cardamon, cucumber and fruits, depending on season and availability. All the villagers are said to have the right to harvest NTFPs. The extent to which households generate income from NTFPs depends on the amounts of NTFPs collected in the forest. This in turn is dependent on two main factors: (i) labour applied and (ii) the abundance of NTFPs around each village. As these factors were difficult to measure, the exact income from NTFPs of each household can only be estimated through percentages (Table 4.7). In livelihood activities NTFPs harvesting plays an important role in the livelihood of local people in each village (18 villages along the National Road 13 N). As shown in the above part, NTFPs are considered a second important source after agriculture activity. The contribution of NTFPs averages more than 50% of the income of households in each village. However day by day, the amounts of NTFPs are reduced. Due to the increased development of farming work, the role of NTFPs are also decreased. Although local people harvest many kinds of NTFPs for both subsistence and for sale, products for sale are limited. Table 4.7 and Figure 4.4 show main products and average income of each household per year.

Table 4.7 Main Products and Average Income of Each Household per Year

Product	Comment	Unit	Quantity	Price (Lao kip)	Average income (Lao kip)	Percent (%)
Rattan (Vai)		stem	216	1,500	324,000	2
Broom reed (Kheme)	Major trade of raw material to Thailand, Value-added factory processing greatly needed	kg	250	4,000	1,000,000	6
Incense bark (Puak Muak)	Major potential export to China.	kg	1,050	7,000	7,350,000	41
Bitter bamboo shoot (Nor Khom)	Considerable local trade-major potential markets in China and locally	kg	470	2,000	940,000	5
Cardamon (Mak Neng)	Major potential export to Thailand and China	kg	103	70,000	7,210,000	41
Wild animals(bamboo rate, squirrel, snake, muntjak deer, swine … etc	Major the female merchant buy and taking to the city	kg	12	35,000	400,000	2
Others					500,000	3
	Total				**17,724,000**	**100**

Note. 1. Others here include mushroom, cassava, fuel wood, bamboo, cucumber, banana flower, and fish

2. Data obtained by interviews during the period June to September 2010 from field (Xai to Namo Districts)

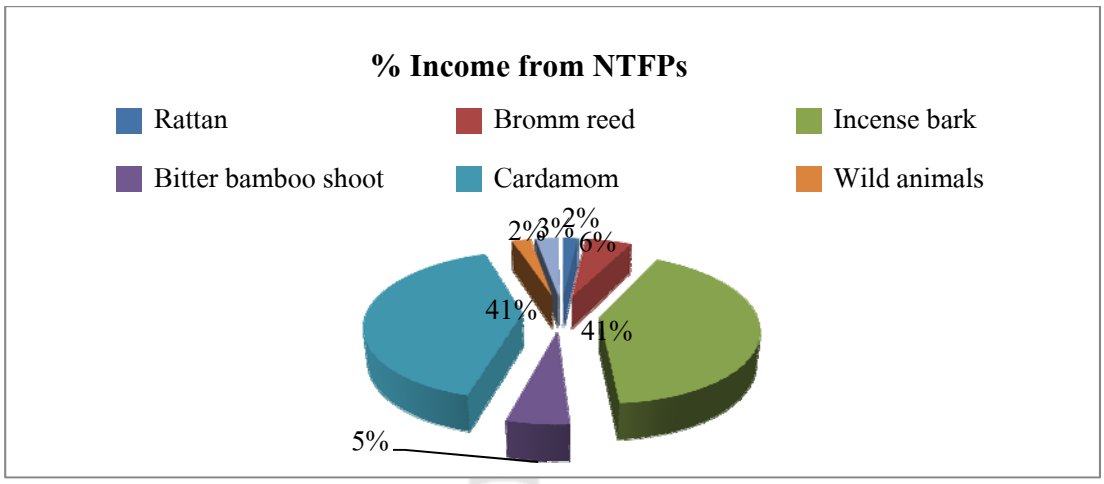
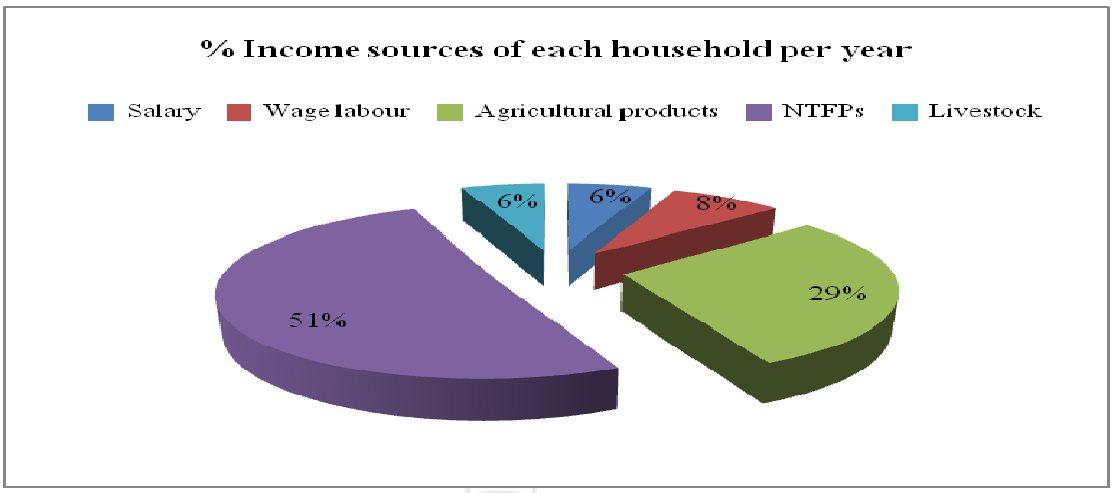


Figure 4.4 Main Products and Average Income of Each Household per Year (percent)

Figure 4.5 Main Non-Timber Forest Products

Others NTFPs are mostly for household use such as bamboo shoot, vegetable, fish, fuel wood, all of which are shown in note. Although they do not play an important role in their income source, they contribute to the subsistence of local people, with some products being used as food, some as necessary daily material. In another words, NTFP harvesting meets the needs of local people living near forests in both districts. So, according to each income is shown in above could summarize in the



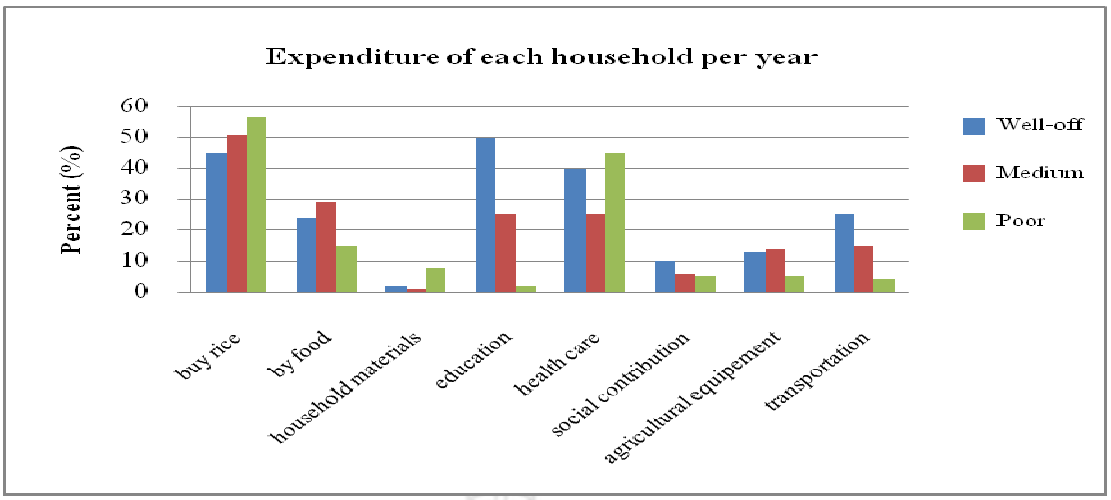
Note. Data obtained by interviews during the period June to September 2010

Figure 4.6 The overall income from research findings are summarized in percent

4.1.9 Expenditures

Food is the highest expenditure item of the villagers, while livestock is not free in investment. The reason is that mostly well-off households can produce enough rice for consumption and can plant vegetables in their garden to save money in food expenditure. Medium and poor groups spend more than 50% of their disposable income for food because rice is not enough for them during the whole year. To raise livestock, all households use food from nature such as vegetable or agriculture products like corn and cassava.

Another noticeable point is health, although the majority of villagers receive sponsorship from the government for free medicine, health insurance and service, serious sickness cannot be cured at village clinic, they must go to the hospital and spend much money for this item. In addition, with the low condition and weak sanitary conditions, local people get sick easily, especially the poor. Therefore, the poor expend more money for health service as shows in Figure



Note. Data obtained by interviews during the period June to September 2010

Figure 4.7 Expenditure of Each Household per Year (percent)

4.2 The Socio- economic Impact of Rehabilitation of the National Road 13 N Constructions.

The data on socio-economic impact from rehabilitation of the National Road 13 N were collected from group discussions and interviews of households. The consequences of seven main impacts are shown in Table 4.7: Main Impacts of Rehabilitation of the National Road 13 N and are explained below impact-by-impact in subsequent Sections of Table 4.1: Social Impacts and Sections of Table 4.2: Environment Impacts.

4.2.1 Loss of houses

The project has expanded the road out for two meters on each side, but has neglected to relocate affected households. Local people's houses have tiles/cogon thatch roofs (one-story houses) and require relocation at km 30 (Kulong village) and at km 46 (Nathong village), with a total relocation area of 398 square meters. Affected households have to move by themselves and impacted communities receive no compensation from project stakeholder. Project stakeholders said that before this project will start they will respond to or compensate each household who lose

home areas or tiles roofs. Until now eighteen households in eighteen villages have not received compensation from this project (according to data from each interviewee and head of village from June to July 2010). As shown in Figure 4.8

Figure 4.8 Loss of houses

4.2.2 Loss of shops

Fifty-six shops were destroyed or demolished from rehabilitation of National Road 13 N from Xai District to Namo District along the project's 78 km length. At this moment, shop owners in each village receive income from selling clothes, drinks …etc, along the road. The owners lose an average of approximately 350,000 kip/month (approximately three months). After their shops were demolished for the project they had to build new shops by themselves using their own money (according to data from each interviewee and head of village from June to July 2010). As shown in Figure 4.9

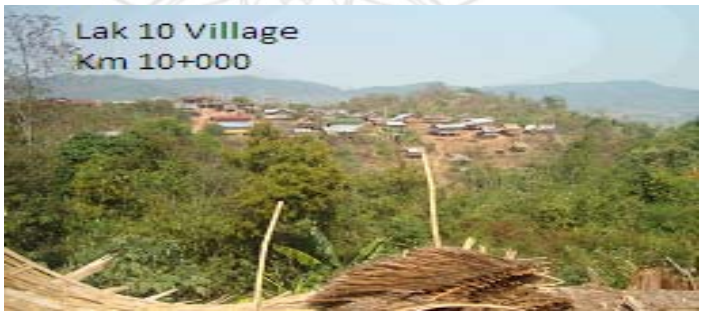


Figure 4.9 Loss of shops

4.2.3 Loss of fences

Temporary fences and brick walls at three villages were impacted by the project. 12 households have temporary fences made from bamboo culms (172 meters length) and 8 households have brick walls made by concrete (60 m3) or permanent fence (from villagers interviewed from June to July 2010). As shown in Figure 4.10

Figure 4.10 Loss of fences

4.2.4 Loss of garden lands

This project involves providing road access to borrow pits and also for workers' camps so it is a major problem (100%) on four household's garden land where there plant rubber trees. The impact on one household is (40m x 50m= 0.2 ha, destroyed rubber trees is 100) at km 30 but this project gave the household only 500,000 kip or 62.85 USD in compensation. There is also impacts on corn unity garden at km 49 five(5) households is 1.2 ha (already harvested) and galanga plants (Ton Khar) three (3) households is 0.6 ha (already harvested) at km 77 lost without any compensation). According to interviews at four households, household members already seriously complained to the Lao committee of this project and were dissatisfied with the project proprietor's compliance with. They are still waiting for compensation for their loss. As shown in Figure 4.11

Figure 4.11 Loss of garden lands

4.2.5 Loss of electricity poles

Due to this project requiring the expansion of existing roads from 5 meters to 7 meters , some electricity poles were affected and ten electricity poles had to be reinstalled without compensation to affected owners of business enterprises and companies (according to interview of the Deputy Director of the Lao Party of this project on April, 2010). As shown in Figure 4.12

Figure 4.12 Loss of electricity poles

4.3 Environmental Impact of Rehabilitation of the National Road 13 N Construction

Environmental impact data from rehabilitation of the National Road 13 N from Xai District to Namo District along the 78 km road section in Oudomxai Province is collected from group discussion and interview of the household. Interviews were made on the consequences of seven main impacts as shown in detail the following subsections:

4.3.1 Loss roadside water pipes

Road widening has the potential to destroy these water supplies, at least temporarily and possibly permanently. At Lak 10 Village the community (5 households with 60(ml) x20 (cm) length) cannot use water pipes for almost more than one month because the company destroyed water connection pipes and drainage along the roadside, but the contractor did not compensate affected residents anything from this problem. As shown in Figure 4.13

Figure 4.13 Loss of roadside water pipes

4.3.2 Loss of riverside vegetation

Riverside vegetation has a variety of ecological functions and should be strenuously protected. Since most existing alignments of the road project follow rivers and streams, widening of the National Road can cause damage to the riverside vegetation, especially in the national road section passing through the Nam Kor, Nam Sea, Nam heng1, Nam Phaeng2 and Nam Veun Rivers. These major rivers are crossed by the road project. Loss of river gardens means loss of food security and income for many villagers.

Figure 4.14 Loss of riverside vegetation

4.3.3 Depletion of Natural Resources and Food for Road Workers

The establishment of construction camps at km 30 (Kulong Village), km 70, and also small camps around 7 points along the roadside for workers pose adverse impacts to the sustainable utilization of natural resources and to the future livelihood of the local people. Construction camps and road construction workshops often use large amounts of bamboo and timber for camp construction. Road workers are inclined to use wood as fuel for cooking food and for heating bitumen. They want to harvest forest fruits and vegetables to vary their diets. This may cause depletion of natural resources. As shown in Figure 4.15

Figure 4.15 Depletion of natural resources and food for road workers

4.3.4 Atmosphere (air quality)

The project road created air pollution impact to communities in the surrounding area and to the natural environment, especially at Namveuntai Village at km 48. The road project's trucks carried soil or rock materials every day without spreading water on their route to minimize dust. In addition rock demolition was done occasionally because of borrow pits, therefore 32 households were impacted from road rehabilitating due to children getting sick, 5 children from 5 households for 3 weeks (from interview 5 households on 18 July 2010) because ill from dust from dumps trucks carrying the material pasts villages every day. Villagers were also worried about their safety, and would like the contractor to build temporary roads or new road access for dump trucks carrying the materials by according to the Ambient Air Quality Standards for protecting pollution from road rehabilitation (MCTPC, 2000). As shown in Figure 4.16

Figure 4.16 The project road created air pollution

4.3.5 Impacts on Soil

The embankment should be stabilized properly to avoid any swelling and shrinking otherwise it may result in deterioration of the embankment. Placing of loose soil for embankment preparation would cause significant soil erosion in case appropriate stabilization. Measures were not adopted promptly. The erosion at construction stretches will result in increased sediment load in recipient streams. More-over leakages of lubricants in equipments yard and spills at asphalt plant sites will cause soil contamination. There is also a loss of natural resources along the roadway due to widening of road through natural and forested areas. This another important loss of resources as improper attention to erosion and sediment control results in poor quality soils along the road and a negative impact to water quality and aquatic life in the receiving streams. Good practices during and after construction include erosion and loss of sediment protection. This means that contractors should control the slope of cut terrain within acceptable values of practice, that steep slopes should be terraced, and side slopes should be replanted with grasses and natural vegetation to retain top soils, using silt fences, and planting of the slopes and terraces with grass and other natural vegetation. Planting must be made during the wet season and carefully planned and maintained by the contractor during the first dry season to ensure survival of the planted vegetation. Often tree seedlings are planted along areas that were denuded of trees due to construction. Re-vegetation and reforestation are important parts of the Environmental Management Plan (EMP) for roads, but in this case, no such EMP was produced and rehabilitation was not required or supervised by the DoR. A cost figure per square meter of

hillside or road slope can be used as mitigation measures to estimate the value or cost of the re-vegetation or reforestation along the roadway. As shown in Figure 4.17

Figure 4.17 Impact on soil

4.3.6 Loss of forest

Due to the earth and stone needed for rehabilitation of the national road 13 N project, cut earthwork totaled 184,460 m^3 .The total filling earthwork is 201, 276 m^3 including sub grades earthwork and backfilling of retaining wall. Therefore the borrowed earthwork is 125,410 m^3 and the earthwork for spoils is 101.761 m^3 (China-aid north section of Nateuy-Xai road rehabilitation project in Lao PDR, 29th June, 2009). Documented impacts from the aforementioned forest resources exclude the number of trees lost from clearing forest, and also exposed stone for obtaining rock materials due to time constraints for data collection. Therefore it was only possible to estimate forest loss in square meters for four borrows pits at km 13, km 30, km 48 and km 78. Losses totaled is approximately (200m x 200m x 4= 16 ha) by real observed and interviewed villages near the borrow pits location. As shown in Figure 4.18

Figure 4.18 Loss of forest

4.3.7 Noise/Vibration

Temporary impacts in the immediate vicinity along inhabited rural and city stretches occur due to noise generated from rehabilitation activities superimposed by existing vehicular noise, creating an important problem. The magnitude of impact will depend upon specific types of equipment to be used. The noise level generated from a source is reduced with increase in distance from the source, because of sound wave divergence. However, no major complaints were received from project impacted households, who are used to the noise from passing vehicles, especially motorcycles, vibration from the exploitation of the near-by quarries, was likewise not singled out as an environmental issue. There were no incidents of flying rock damaging nearby houses or endangering villagers. Thus no mitigation measures were assumed to be necessary and no costs were assigned for reduction of noise or vibration to acceptable levels or protection of the villagers against such impacts.

4.4 Summary of Social and Environmental Impacts from Rehabilitation of National Road 13N.

Table 4.8 presents a summary of the social and environmental impacts on households impacted by the rehabilitation of National Road 13N. The summary is based on data obtained from the interviews with 106 households and from observations, and discussions with key government staff.

Table 4.8 Summary of Social and Environmental Impacts

No.	Impacts	No. of HHs	Unit	Quantity
1	Loss of wood houses and tiled/thatch roofs	16/2	HH/m^2	16/398
2	Loss of brick fences	8	m^3	60
3	Loss of wood fences	12	ml	172
4	Loss of permanent shops	56	unit	56
5	Economic loss to HHs with Shops	56	month	56

Table 4.8 (continued)

No.	Impacts	No. of HHs	Unit	Quantity
6	Loss of water pipes	5	ml	60
7	Loss garden lands	9	ha	2
8	Loss of garden crops annual(corn or galanga)	3	year	5
9	Loss electricity poles	R*	pole	10
10	Loss of forest	-	ha	16
11	Sickness	5	day	21
12	Loss of rubber trees	1	tree	100
	Total	**106**		**322**

Note. Data obtained by interviews during the period June to September 2010 from field (Xai to Namo Districts) and R* from Deputy Director of Lao Party of this project who gave data (Phonepadit, April 2010)

4.5 Mitigation Measures and Cost Evaluation of Options

From data analysis above, we can therefore calculate the estimated costs of social and environmental impacts and/or evaluate appropriate mitigation measures for reducing these impacts to acceptable levels or the costs of "best practices" as indicators of the damages to impacted project persons. Costs were also obtained by comparing the compensation rate or standards used in other successful national road projects in Lao PDR. Therefore for compensation cost, the amount depends on the number of houses, shops, fences, land and water pipes to be moved and their respective estimated cost to be compensated required for affected persons. In this regard, houses are classified into two categories, i.e. houses in permanent condition and houses in temporary condition and the number of both categories of houses. Compensation rate are calculated in this research (Appendix C) and also mitigation measures, which are shown in detail in Tables 4.9, 4.10 and 4.11.

These mitigation measures are standard practices or "best practices" for road projects used in Lao PDR and elsewhere as referenced in the literature review.

Table 4.9 Mitigation Measures for Road Construction Impacts

No.	Environmental and Social Impacts	Detail Information	Mitigation Measure Options	References/Methodology
1	Loss of wood houses and tiles/ Cogon grass roofs	-16 households had to move out and 2 houses had to be demolished (398 m^2) from the roadside	-Contractor should pay appropriate compensation for loss of houses to each household -Find out new location/resettlement for people who lost houses and also compensation measures for them -Provide the same sum of wood as those lost, and enough compensation for rebuilding houses. Extra compensation is necessary. Or give them enough money as compensation.	ESD/ MPWT
2	Loss of brick walls	-Loss of 60 m3 of brick walls in 8 households	-Contractor will pay appropriate compensation for loss of brick walls to each household(which covers materials and labor cost) -Provide the same sum of building materials for brick walls to the loss, and enough rebuilding fees for them. Extra compensation is necessary	ESD/ MPWT
3	Loss of wood fences	-Loss of 172 meters long (ml) of wood fences in 12 households	-Contractor will pay appropriate compensation for loss of wood fences to each household -Provide the same sum of building materials for wood fences to rebuild lost, or compensate money for them. Extra compensation is necessary.	ESD/ MPWT
4	Loss of permanent shops	-Loss of 56 permanent shops in 56 households	-Contractor should pay appropriate compensation for loss of shops to each household and also pay for number of days of	ESD/ MPWT

Table 4.9 (continued)

No.	Environmental and Social Impacts	Detail Information	Mitigation Measure Options	References/Methodology
			lost incomes until a new shop is rebuilt -Contractors should help the shop owners rebuild in the resettlement area, or give them money equivalent to the cost of the shops	
5	Loss of water pipe	-Loss of pipe line 60 (ml) water pipe at 5 households, resulting in inability to use water for one month	-Help affected households rebuild water supply system	CSC(daily),ESRS (monthly),ESD/ MPWT (quarterly)
6	Loss of garden lands	-Loss of 2 ha garden lands in 9 households from opened borrow pits and camp construction	-Do not site borrow pits or dispose of cut spoil on garden lands -Ensure appropriate compensation for loss of garden lands to each household - Provide similar fertile lands	ESD/ MPWT,MAF
7	Loss of electricity poles	-Loss of 10 electricity poles along road project	-Compensate communities for the loss and help them rebuild electricity supply system.	CSC(daily),ESRS (monthly),ESD/ MPWT (quarterly),
8	Loss of riverside vegetation	-Loss of riverside vegetation from Rehabilitation of the National Road 13N	-Where road alignment is close to the rivers, widening / re-alignment should be on the side not adjacent to the river -Avoid clearing riverside vegetation during road rehabilitation except where absolutely necessary.	CSC(daily),ESRS (monthly),ESD/ MPWT (quarterly)

Table 4.9 (continued)

No.	Environmental and Social Impacts	Detail Information	Mitigation Measure Options	References/Methodology
			-Reduce damage	
9	Depletion of natural resources and food for road workers	-Depletion of natural resources through demand for building materials, fuel and food for workers	-Do not harvest wood resources within protected areas -Do not allow construction camps to become permanent settlements, remove camps prior to project completion -Use non-wood fuels such as liquid propane gas or kerosene for cooking food and heating bitumen -Where local materials must be used make agreements with local communities about the areas or the volume that can be harvested without significant impact -Control the depletion and strengthen worker management	CSC(daily),ESRS (monthly),ESD/ MPWT (quarterly),MAF
10	Air quality	-5 children in 5 households got sick from dust caused by trucks carrying materials passing through the Namveuntai Village	-Control contractor vehicle speed, dust and flying debris by covering loads or wetting material if necessary -Construct temporary roads if necessary -Use locally available construction materials wherever possible to minimize transport distance -Discuss with those affected at all stages. Pay reasonable compensation for impact on properties and/or disruption of incomes.	CSC(daily),ESRS (monthly),ESD/ MPWT (quarterly),WREA CSC(daily),ESRS (monthly),ESD/ MPWT (quarterly),WREA

Table 4.9 (continued)

No.	Environmental and Social Impacts	Detail Information	Mitigation Measure Options	References/Methodology
			-Spread water on road 2 times per day during construction -Check vehicle every month, use tarp covered truck while carrying loads -Take action to control the air pollution and cure illness from air pollution	
11	Loss of forest resources	-Loss of 16 ha forest land from road access or opened to borrow pit or quarry and other habitat disturbances and comprised cut trees.	-Reforest -No committee and staff of project cut trees out from site	CSC(daily),ESRS (monthly),ESD/ MPWT(quarterly),MAF
12	Noise/Vibration	-The effects of noise on areas especially when people are sleeping	-Time blasting activities so as not to disrupt local people -Inform people of possible damage from vibration before using vibrating rollers near settled areas -Site quarries away from community and livestock areas -Take actions and use machines to control the noise /vibration -Set operation time from 7am to 18 pm,	CSC(daily),ESRS (monthly),ESD/ MPWT (quarterly)

Note. Rehabilitation of National Road R3 paper (January 2005), and based on this research's analysis

Compensation standards for houses and attachments of MPWT (December 15th 2008 and January 11th 2009), Lao PDR are shown in Table 4.10: The information shown is taken from Appendix C1 and C2 of the same document (MPWT& DoR, December 15th 2008 and January 11th 2009). The calculations for the costs estimates for social and environmental impacts are thus based on these standard compensation rates and the final calculations are shown in Table 4.11:

Table 4.10 Compensation Standards for Houses and Attachments

Categories	Impact Items	Compensation Rate (US$)
C1: National Road 1B,December 15th 2008)		
Houses and Attachment	Brick Concrete Structures	$45/m2
	Wooden Structures	$30/m2
	Rice Storage(wooden 12 units)	$18/m2
	Rice Storage(bamboo 10 units)	$10/m2
	Fence	$1/meter
Affected Shops	Concrete Structures	$25/m2
	Wooden Structures	$20/m2
Permanent Land Acquisition	Paddy Land	$3 /m2
	Fish Pond & Garden Land	$3 /m2
	Housing Land	$5 /m2
Moving Allowance	House Relocation Moving Allowance	$30 per HH
	Shops Moving Allowance	$30 per HH
	Shop Business Loss	$750 per HH
	Gasoline Station Moving Allowance	$20 per shop
	Gasoline Business Loss Compensation	$100 per station

Table 4.10 (continued)

Categories	Impact Items	Compensation Rate (US$)
Attachments and Facilities	Electrical Tower	$450 per Tower
	Trees	$25 per piece
	Water Tap	$60 per piece
	Water Pipelines	$500 per km
C2: (National Road 6A,January 11th 2009)		
Houses and Attachment	Concrete Structures	$40/m2
	Concrete Wooden Structures	$35/m2
	Wooden Structures	$30/m2
Affected Shops	Concrete Structures	$25/m2
	Wooden Structures	$20/m2
Permanent Land Acquisition	Paddy Land	$3 /m2
	Fish Pond & Garden Land	$3 /m2
	Housing Land	$3 /m2
Moving Allowance	House Relocation Moving Allowance	$30 per HH
	Shops Moving Allowance	$30 per HH
	Shop Business Loss	$300 per HH
Attachments and Facilities	Electricity pole	$450 per pole
	Trees	$25 per piece
	Fence	$5 per meter

Table 4.11 Cost Estimates of Social and Environmental Impacts from the Rehabilitation of National Road 13N.

Items (1)	Quantity (2)	Unit (3)	Unit Compensation (USD) (4)	Total Amount (USD) (5)-(2)*(4) (5)
1. House Demolition				
Moving allowance	16	HH	30.00	480
Wooden houses	398	M^2	30.00	11,940
2. Fences				
Brick fences/wall	60	M^3	40.00	2,400
Wooden fences	172	ML	5.00	860
3. Shop Demolition				
Permanent shops	56	HH	30.00	1,680
Economic loss to HHs with Shops (Three months)	56	HH	34.70*	5,830
4. Paddy Land				
Garden lands	20,000	M^2	5.00	100,000
Loss of garden crops annual 5 years (corn or galanga)	3	HH	250.00*	3,750
5. Electricity poles	10	Piece	450.00	4,500
6. Water pipes	60	ML	10.00	600
7. Treating Sickness	21	HH/Day	10/days	1,050
8. Rubber trees	100	Trees	1.24/tree	124
Total Cost Items 1-8(TC)				133,214
Total Estimated Costs to PAPs	1	USD		1,198,900
9. Forests	16/100	Ha/Rai	4,899.29	489,929
Total Cost Items 1-9		USD		1,688,855
10.Training and Capacity		0.5% of items 1-9	0.005	8,444
Total Cost Estimate of the Social and Environmental Costs				**1,700,000**

Note. 1. Unit cost of project impacted forest in Thailand from published references, Course on Forestry and Forest Management, on March 5th 2011

2. National Road 1B (December 15th 2008) and 6A (January 11th 2009), World Bank and Compensation Standards of MPWT, Lao PDR, and based on this research's analysis

4.6 The Total Rehabilitation Costs of the National Road 13 N from Xai District to Namo District

According to Table 4.11 we can now summarize the estimated total costs of National Road 13 N from Xai District to Namo District. Costs that should be included are shown in Table 4.12 below

Table 4.12 Calculation of Total Costs of Rehabilitation of National Road 13N Including Social and Environmental Costs to Project Impacted Persons

Items	Description of work	Cost estimate (USD)	% Percent 4=(3x100)/Total Costs
1	2	3	4
1.	Social and Environmental Costs	**1,700,000**	**4%**
2.	Road Rehabilitation Work Costs	**41,552,500**	**96%**
Total Estimated Real Cost from Thesis Research including Social and Environmental Costs of the Project		**43,252,500**	**100%**

Note. 1. Total costs of rehabilitation of the National Road 13N is USD 41,522,500 (secondary data)

2. Interviewee from June to October 2011, and World Bank and Compensation Standards of MPWT (December15th2008&January11th2009), Lao PDR, and based on this research's analysis

Therefore the total cost of this project, including social and environmental costs, was determined from this research to be equal to 43,252,300 US$. As can be seen from Table 4.12, the environmental and social costs account for approximately 4% of total costs, while the rehabilitation of construction costs account for 96% of the total cost of this project. This estimate is on the low side of the range of environmental and social costs (1-7 percent) of total road project costs as referenced in the literature. No amount of funds was estimated for environmental supervision or management by the contractor and/or project proponent and no estimate was made also for monitoring costs to verify that implemented mitigation measures were adequate and satisfactory. Thus, environmental and social impacts costs would be higher as a percentage of total road costs for the contractor if such actions were part of his Environmental Management and Monitoring Plan (EMP). But as previously discussed, no such plan was produced or implemented by either the contractor or the project proponent.

4.7 Analysis and Discussion

4.7.1 Benefits and Losses from the Project

When the Rehabilitation of National Road 13N is completed in 2012, future benefits for villages that have access to the road include more convenient travel to schools, markets, and hospitals, as well as improved communication from the village, to the district, to the provincial levels. In the future, motorists who pass through this highway will also generate additional income for villagers, who can sell larger number of accommodations, homegrown crops, or commercial goods to motorists (when compared with current trade and service volume).

At the government level, when the Rehabilitation of National Road 13N is completed, the Lao PDR government will be able to collect tax from vehicles passing through this highway. This will allow for villages located along the total 78 km section of National Road 13N from Xai District to Namo District to receive benefits from transportation of goods along the road from China, Thailand, and Vietnam.

Losses from Rehabilitation of National Road 13N are mainly those that arise during the construction period, such as accidents, losses of income from expansion of the road width, which resulted in demolishing and relocation of shops. Losses to households, which were also

demolished and relocated, also occurred. Villagers did not receive sufficient compensation due to compensation being based on negotiation rather than fair, fixed rates. Loss of water, soil, and garden land also added to the losses of villagers, due to the inability to plant crops at home to feed themselves. This all contributed to villagers facing more burdens in their livelihood.

Even though large numbers of Chinese workers moved to this area to work on the Rehabilitation of National Road 13N, the economic gain to villagers were minimum, as most Chinese workers are supplied with products directly from China (food or daily consumer products), which are exempt from Lao or Chinese tax and can be easily transported to the area along a 35 km distance from (Namo District) the Laos-China border to the project site.

The project camp also lacks proper hygienic facilities, treatment facilities for waste from humans, chemicals from equipment, vehicles, or machinery. These wastes will affect villagers in term of health in the future and these can also causes environmental impacts such as deterioration in local soil quality, parasitic or infectious disease. These problems can be happened due to lack of legislation or regulation, as well as lack of EIA conducted at the project site.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This study quantified the negative impacts by EIA guidelines for road projects in Lao PDR by examining the gap of EIA implementation between Lao PDR and other countries in order to improve current assessment of social and environmental impacts. Methodology and Analysis of Results are detailed in Chapters 3 and 4 respectively. This chapter summarizes the current EIA implementation in Lao PDR, usefulness of the developed EIA guidelines, together with limitations and recommendations for the future.

This estimate is on the low side of the range of environmental and social costs (1-7 percent) of total road project costs as referenced in the literature. No amount of funds was estimated for environmental supervision or management by the contractor and/or project proponent and no estimate was made also for monitoring costs to verify that implemented mitigation measures were adequate and satisfactory. Thus, environmental and social impacts costs would be higher as a percentage of total road costs for the contractor if such actions were part of his Environmental Management and Monitoring Plan. The analysis of impacts of rehabilitating the National Road 13N through the Xai and Namo Districts found that approximately US$ 1,700,000 of socio-economic and environmental costs were imposed upon these districts by the construction works. This is equivalent to about $88 per person for the 19,195 persons living along the 78 kms stretch of road (or about 13.5% of their GDP). The costs of mitigation and compensating all project-affected-persons amounted to only 4 percent of total road construction costs…… not a large amount of additional monies to have included in the road contract for the costs of social equity and environmental protection and preservation. The total imposed costs of

4% of total road costs is on the low side of the range referenced in the technical literature (1-7 percent of total costs).

However, no amount of funds was estimated for environmental supervision or management by the contractor and/or the project proponent and no estimate was included also for monitoring costs to verify that implemented mitigation measures were adequate and satisfactory. This is a significant amount and should have been compensated for as part of the road rehabilitation costs.

5.1.1 Current EIA Implementation of Road Projects in Lao PDR

The collected EIA feasibility studies of road projects in Lao PDR indicate that the Department of Roads or Oudomxai Provincial Department of Public Works and Transport pays attention to social and environmental concerns in terms of land use, quality of life, and public participation. Social and environmental impacts herein result from changes of the environment; land use changes mainly from direct impacts of expropriation from land owners or entitles residents, agriculture area, and commercial area. Quality of life emphases impact assessment from pollution and relocation of facilities and services. The public participation is conducted for surveying people's attitude and needs, and informing impacted persons about relocation. Both negative and positive impacts are studied by EIA process, however negative impacts are mainly considered. Impact analysis of this study generally assesses direct impacts because further analysis requires budget, time and trained personnel for research, use of economic models, tools and standard techniques.

5.1.2 Usefulness of Developed EIA Guidelines

Usefulness of EIA guidelines is obtained by comparing between the existing EIA implementation and the proposed EIA guidelines. The existing scopes of social and environmental assessments are more broadly identified. Developed guidelines are proposed to fit for road projects in Lao PDR and the expected usefulness is described below:

5.1.2.1 Clear Impact Identification

Main methodology of guidelines development is to use data from interviewing and data mapping; the impacts are incorporated into the road development project. The relationship of social and environmental impacts can be captured and arranged by impact identification; so that

the consequences of each impact are systematically studied and recorded. Interdependence of social and environmental impacts can be reduced in this guideline; so that data collection and impact analysis in EIA will reduce duplication.

5.1.2.2 Assessment at Community Level

The existing community profile uses questionnaires in sampling groups to draw community characteristics. This method is both practical and economic for developing countries. It is argued that collecting data from published reports on these groups cannot represent the actual condition so that collecting and reviewing secondary data in community level must be in addition to actual interviewing to build a proper community profile. Even though data availability is limited, the guidelines suggest that relevant data can be obtained from local government documents to enhance information obtained from field sampling surveys.

5.1.2.3 Assessment in Actual Land Use of Community

The EIA guidelines assess not only property expropriation but also people's living on their land use. Living of people related to their land use is condition of resident, agriculture activities, and operation of religious rituals. Mobility and accessibility of residents in community are assessed. The land use is not only physical aspect but also psychological aspect; so that religious rituals are accounted for. Moreover this guideline proposes consistency of project with other plans in order to draw cooperative development on the study area.

5.1.2.4 Social and Environmental Value Identification

Social and environmental values of community are subjective and unique assessment; thus residents are a key to evaluate these values. This guideline enhances assessment by attitudes in process. It is useful for revealing community awareness about the effects of a project on their existing living.

5.1.2.5 Assistance Programs of Relocation

Relocation impact assessment is inadequate if it only includes fair compensation for relocated people because compensation alone does not guarantee that their replacements are enough for a decent living. If relocated people are low income, minority or disadvantaged persons, relocation may result in severe exploitation on their quality of life.

5.1.2.6 Broader Safety Impacts

Safety of motorists is considered in engineering design; however safety impacts of residents are not accounted for. EIA guidelines yield broader safety for community that considers unsafe conditions on patterns of pedestrians, bicyclists, motorcyclists, and users of local buses. Life of community must be considered as part of impact assessment.

5.1.2.7 Broader Economic Impacts

EIA study uses results of random sampling to draw the socioeconomic condition of study area and to predict what economic changes are. The opponents of this assessment argue that economics of the community are not only income or employment but also viability of economic sectors or components. So that economic impact assessment in this guideline proposes to review economic operations in community and check their viability. The main components are their livelihoods as well as the survival of businesses or industries, agriculture products and processes, tourism, and property value; impacts on them need to be assessed as well in social impact assessment.

5.1.2.8 Disadvantage Identification

Civil rights system between developed and developing countries is definitely different so that implementation of civil rights in developing countries consumes additional resources as limited. Actually, this is true only in one respect; but it is not a reason to neglect civil rights in feasibility study. However civil rights on this guideline does not duplicate from developed countries; but concept of civil rights should be proposed in EIA and SIA in order to concern their general living, well-being, health, and their active role in public participation throughout the planning and implementation process.

5.1.3 Valuation of this Thesis Research

The valuation of this thesis research includes two categories:

5.1.3.1 Advantage

At this moment the community can better understand about the Lao laws and EIA regulations in Lao PDR and also what project activities are being implemented in a correct or wrong manner.

The new generation can be able to file grievance if the future project impacts occur again and have the opportunity for such grievances to be properly addressed by the government and the project proponent.

5.1.3.2 Disadvantage

Using the Lao PDR law or EIA regulation is not enough to control foreign contractors' compliance because the lack of strict implementation of the law allows such contractors to ignore problems, and disregard the social and environmental impacts from the project. The contractors are only concerned to satisfy the confidence of the financiers.

5.2 Recommendations

Recommendations are proposed for successful EIA guidelines and further studies in the future. Monitoring of assessed impacts enhance cross-check of assesses impacts and improvement of assessments. Thus implementation and monitoring of the EIA must be a standard condition for future road projects. Phrased-stages between feasibility study and road project design and construction require that compatible guidelines be put into practice.

People or residents are vital to define what impacts are; proper public participation can enhance precision of assessment. It is recommended thus further study of how public participation can be enhanced in road planning and construction is needed to ensure consistency with this guideline and achievement of the goals of the government for reduction of poverty and improved economic life of the rural people.

Due to the facts that many stakeholders have different orientations, a cooperative environment for carrying out the EIA study can assist in the effectiveness of the social and environmental impact assessment. Stakeholders' meetings are needed to identify and evaluate social and environmental impacts during the planning stage (well before construction being).

The concepts of sustainable development need to be adopted for national, and provincial plans especially mitigation measure planning. These plans should concentrate not only on addressing economic growth that harms natural resources. Sustainable development is long term development goal that conserves and protects natural resources. Reforestation of destroyed natural forest is a necessary mitigation measures for road and infrastruction projects. This

mitigation measure ensures improved sustainability of the natural forests. The costs for reforestation should be an integral of the road development costs. This process is not happening in Lao PDR at present.

Decentralization of power, authority and increased budget to the province are needed to make the province have more decision-making authority to be more responsive to local needs and conditions. And most important to permit provincial authorities to enforce regulations.

There needs to be an integrated environmental plan at the provincial level, and a process to monitor the development projects that may impact on the environment in the province. This could be achieved by upgrading the Office of the Provincial Governor to include greater capacity for dealing with environmental matters.

The participation of the local people and company should be facilitated by government officials, especially at the district level.

Law enforcement for the road EIA regulation should be considered. At present, Lao PDR has quite enough laws and regulations. Until now, the lack of law enforcement by government officials is still mentioned by many people and organization because of lack of personal concerns and lack of resources in local setting. Some proponents believe that if government officials had strong law enforcement, community problems would not be a big issue.

More detailed study of people's attitude to society and the environment is needed. The findings of this research could lead to design of the contents of environmental education for local areas.

Study of the capacity of government agencies in terms of planning and coordination such as at the provincial and district levels is needed to deal with the complex, multidisciplinary problem of resource management.

Lastly, the positive economic impacts from Rehabilitation of National Road 13N should be assessed after a 5 and a 10 year period to time following completion of the construction works. The analysis of benefits would permit a cost/benefit ratio to be derived for rehabilitation of road projects and clarify achievable objectives of such projects for the Department of Roads

5.2.1 Limitations of Research

Positive impacts from rehabilitation of National Road 13N could not be quantified during this research due to limitations in time and funding, particularly because the rehabilitation road work was just recently completed. In addition, it is possible that not all potential impacts may have been identified through the interview approach. Physical sampling and analysis of soils and waters were not undertaken.

5.2.2 Suggestion for Future Research

The impact assessments proposed in the EIA guidelines are able to reveal and mention what social and environmental impacts should be. Precise assessments require their further studies in order to analyze each impact as has been pointed out that social and environmental impacts are particular and distinctive. It is recommended that these further studies should be conducted by partial assessment of each impact category or perspective for enclosure area; so that a broader view of EIA will be employed that incorporates many techniques to examine social and environmental impacts.

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APPENDEXS

APPENDIX A

QUESTIONAIRE INTERVIEW HOUSEHOLD FORM

1. Village Name……Group……

Name of Owner/HH Head…… Sex: ☐ Male, ☐ Female ..... Age

……years old …… Name of Spouse…….Village Roster HH……..……

2. Vulnerable HH:☐ Female Headed HH ☐ Elder Head of HH ☐ Handicapped☐

Other……..…...…

2. Highest education level of the respondent

☐ Illiterate

☐ Primary

☐ Lower Secondary

☐ Secondary

☐ Higher

4. Family Information

4.1 How many families live in the house? .....

4.2 How many productive labors in your family?.....

4.3 How many years have you lived here? ☐ 1-10 yrs, ☐ 11-20 yrs, ☐ 21-30 yrs ☐>30yrs.

4.4 Where did you move from?.....

4.5 What were the reasons why you moved here?☐ Cultivated land, ☐ Settlement land ☐ Water resource, ☐ Others:.....

4.6 Any change in terms of natural resources (forest, NTFPs, etc) use compare now and the past?

Forest .....NTFPs .....

5. Information on Hygiene and Health

5.1 What are the diseases/common health problems that mostly occur in your family? ☐ Diarrhea, ☐ Malaria, ☐ Fever, ☐ Headache, ☐ Respiratory,☐ Other:.....

5.2 Are there any problems on infant mortality? How many?.....when?.....

Why? ☐ Die after born, ☐ Fever, ☐ Diarrhea, ☐ Malaria, ☐ Other.....

5.3 Do you have a household toilet? ☐ Yes, ☐ No,

5.4 What do you think about household toilet? ☐ good, ☐ I do not know

5.5 How do you think about public toilet? ☐ Agree ☐ Disagree

☐ I do not know ☐ others

6 Income and Expenditure

6.1 Occupation

No	Occupation	Main Occupation	Extra Occupation
1	Farmer		
2	Seller		
3	Wage labor		
4	Fisherman		
5	Worker		
6	Government officer		
7	Project officer		
8	Handicraft		
9	Other		

6.2 HH Food Security

No	Type of land use	Area (ha or Rai)	Seed (kg)	Yield Kg	Self consumption (%)	Sell (kg or %)
1	Paddy rice					
2	Up land rice					
3	Other crop					
4	Riverbank					

6.3 Food consumption

No	Kind of food	TTT/w	Self raise or explore		Buy			
			Raise	Explore	Time/week	Villager	Shop	Market
1	Vegetable							
2	Fish (aquatic)							
3	Wildlife							
4	Livestock							
5	Other protein							

6.4 Main income sources

No	Item	What type of income?
1	Agriculture product	
2	Livestock	
3	NTFP	
4	Labor wage	
6	Fishery	
7	Salary	
9	Service	
10	Other	

6.5 Main expenditure (Cash purchases)

No	Item	What type of income?
1	Agriculture inputs	
2	Buy rice	
3	Food	
4	House build	
5	House repair	
6	Education	
7	Health care	
8	Clothes	
9	Transport	
10	Other	

6.6 Socioeconomic Profile

1 Household utilities (check all that applies)

☐ Electricity ☐ Trash collection

☐ Piped water ☐ Telephone

☐ Sewerage ☐ Internet

2 Main mode of transportation:

☐ Vehicle ☐ Public transport

☐ Motorcycle ☐ Bicycle

☐ On foot

3 Cooking fuel:

☐ Wood ☐ LPG

☐ Charcoal ☐ Animal waste

☐ Others……..….

7. Main impact from Rehabilitation of the National Road operation and compensation.

7.1 Opinions

Knowledge of Rehabilitation of National Road

a) Did you know about the Rehabilitation project before this? ☐ Yes ☐ No

b) How did you know about the project?

☐ Local authorities ☐ Interviewers

☐ Government agencies ☐ others

☐ Media

7.2 Environmental impacts from Rehabilitation of the national road

No	Type of impact	Impact?	
		Yes	No
2	**Environmental impacts**		
2.1	Dust/air pollution		
2.2	Water pollution		
2.3	Water availability(irrigation)		
2.4	Soil		
2.5	Soil erosion		
2.6	Noise		
2.7	Flood		
2.8	Deforestation		
2.9	Others:		

7.3 Socioeconomic impacts from Rehabilitation of the national road

No	Type of impact	Impact?	
		Yes	No
3	Socioeconomic impacts		
3.1	Electricity		
3.2	Water supply(in house)		
3.3	Telecommunications		
3.4	Transport		
3.5	Education		
3.6	Healthcare		
3.7	Income		
3.8	Job opportunities		
3.9	Social problems		
3.10	Safety		
3.11	Tourism		
3.12	Others:		

8. MOVABLE STRUCTURES

A. MOVABLE RESIDENTIAL (4 TYPES):

1. Wood/Wood with Zinc Roof……..…….

2. Wood/Bamboo with Grass/Bamboo/Zinc Roof……..…...…….

3. Bamboo/Bamboo with Bamboo/Grass Roof…….…….…….

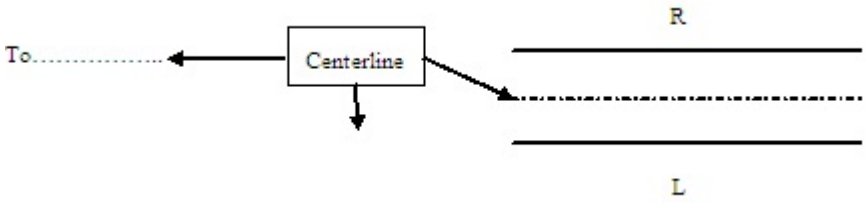
4. Other (Specify)……...…….……...…….

Chain age of Dwelling from Km0+000:…….+ Km…….

Borrow Pit, Quarry, Spoil Dump

ID…….……...……

Sketch of House-Centerline, Corridor of Impact (COI) borders (m):



Col from Centerline:…….m

Can Move back easily on Existing Residential land: Yes ☐ No ☐

If yes, Compensation Value for Land Lost to Row:……..m2 Kip…….……..

If no,

1 st Alternative: Replacement by Compensation:

Total Area of old Residential

Plot=…….……..……..m2

Total Area of New Residential

Plot=……...……..m2

Compensation for New Plot of

land=…….……....kip

2 nd Alternative: Project Will Create New Residential Plot:

New Residential Plot Created by Project, By Date:……Day/month

Attach Community Immobilizer's Plan agreed with Owner/HH Head……☐ Done

Moving Allowance to Owner: kip…….

Total Moving Compensation for Residence (Adjusted Value + Residential Land + Moving Fee) Kip……..

B. OTHER MOVABLE STRUCTURES

1. MOVABLE SHOP

Chainage of Dwelling from km0+000, from:…….+…….……..……

Borrow Pit, Quarry, Spoil Dump ID#.....

Moving Allowance to Owner:

- Woven Bamboo☐ Area:…….m2 kip……...
- Wooden☐ Area:…….m2 kip……...

Lost Income Yes ☐ No ☐

If Yes,

Income per Day:…….kip X……Days Lost Income=

Compensation:……kip

2. MOVABLE RICE STORAGE BIN

Moving Allowance to Owner: Area:…….m2 kip……..

3. MOVABLE KITCHEN

Moving Allowance to Owner: Area:…….m2 kip……..

4. MOVABLE LATRINE

Moving Allowance to Owner: Area:…….m2 kip……..

5. Other (Specify)……. Area:…….m2 kip……..

Attach Community Immobilizer's Plan, if required for preparing new site agreed with

Owner/HH Head ☐ Done

Total Moving Compensation for Other Movable Structures: kip

PERMANENT STRUCTURES

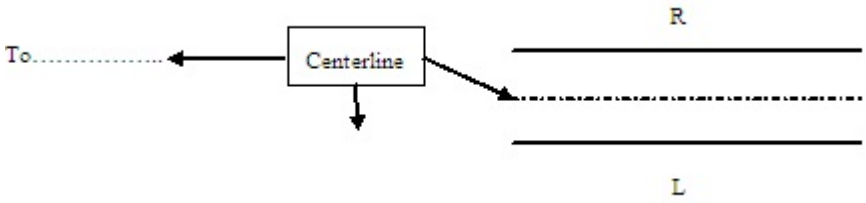
A. PERMANENT RESIDENTIAL (4 TYPES):

1. Masonry……..…….
2. Masonry/Wood…….…..…….
3. Wood with Concrete, Asbestos or Galvanized Roofing Sheets ……..…….
4. Other (Specify)……..……

Chainage of Dwelling from Km0+000:…….……+…….…….. …

Borrow Pit, Quarry, Spoil Dump ID#..... …

Sketch of House-Centerline, Corridor of Impact (COL) borders (m):



Col from Centerline:…….m

Can Move back easily on Existing Residential land: Yes ☐ No ☐

If yes, Compensation Value for Land Lost to Row:……..m2 Kip…….……..

If No,

1 st Alternative: Replacement by Compensation:

Total Area of old Residential

Plot=…….…….……..m2

Total Area of New Residential

Plot=……..…….……..m2

Compensation for New Plot of

land=……..kip

2 nd Alternative: Project Will Create New Residential Plot:

New Residential Plot Created by Project, By Date:……..……Day/month

Attach Community Immobilizer's Plan agreed with Owner/HH Head……☐ *Done*

Moving Allowance to Owner: kip…….

Total Compensation for Permanent Residence (Replacement Value + Residential Land + Moving Fee) Kip……..

B. PERMANENT SHOPS, CEMETERY, AND/OR OTHER

1. PERMANENT SHOP……..……

Lost Income Yes ☐ No ☐

If Yes,

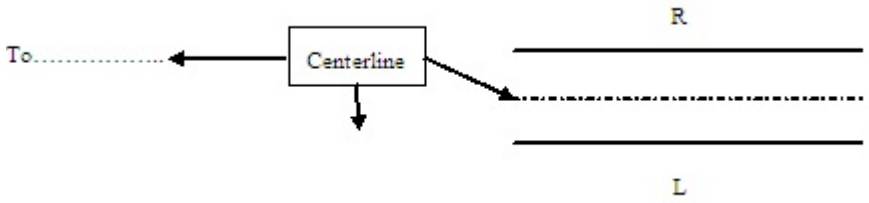
Income per Day:…….kip X……..Days Lost Income=

Compensation:……kip

2. CEMETERY……..……..
3. OTHER (SPECIFY)……..……..

Chainage of Dwelling from km0+000:……+……..……..…..

Sketch of House-Centerline, Corridor of Impact(COI) borders (m):



Col from Centerline:…….m

Can Move back easily on Existing Residential land: Yes ☐ No ☐

If yes, Compensation Value for Land Lost to Row:……..m2 Kip…….……..

If No,

1 st Alternative: Replacement by Compensation:

Total Area of old

Plot=……m2

Total Area of New

Plot=……..……..……..m2

Compensation for New Plot of

land=…….……..…..kip

2 nd Alternative: Project Will Create New Residential Plot:

New Residential Plot Created by Project, By Date:……..……Day/month

Attach Community Immobilizer's Plan agreed with Owner/HH Head…… ☐ *Done*

Moving Allowance to Owner: kip…….

Requirement for Income compensation…….Yes ☐ No ☐

If Yes,

How many Months to Re-establish Income?.....Month(s)

Allowance for Re-Establishment of Income…….kip……..……

Total Compensation for Permanent shop or Other Structure: kip

AGRICULTURAL LOSSES

A. RICE PADDY

Chainage of Dwelling from km0+000:…….+……..…

Borrow Pit, Quarry, Spoil Dump ID#.....

Type of Paddy:

Acquired Area: Length (m) Width (m) Acquired: Area (m2) Kip/m2 Total

1 st Class (5 t/ha) Kip……...

2 nd Class (2-3t/ha) Kip……..…..

3 rd Class (2-3t/ha) Kip……..…..

Total: Kip……..…..

More than 10% of HH's Total 1 st Class Paddy Holdings Acquired Yes ☐ No ☐

More than 10% of HH's Total 2 nd Class Paddy Holdings Acquired Yes ☐ No ☐

More than 10% of HH's Total 3 rd Class Paddy Holdings Acquired Yes ☐ No ☐

More than 10% of HH's Total Paddy Holdings Acquired Yes ☐ No ☐

Note: General Calculation only, Later Verified by External M&E Agency

B. OTHER AGRICULTURAL LAND

Chainage of Dwelling from Km0+000:……+……..……...…….

Borrow Pit, Quarry, Spoil Dump ID#.....

Acquired Area Length (m) width (m) Acquired Area (m2) kip/m2 Total

1. Garden kip…….…….
2. Fish Pond kip…….….
3. Grazing Land kip…….….
4. Swidden Land Allotted Area……...…Ha

Total kip……..…

Likely Impacts on Other Agricultural Land,e.g., Damaging Irrigation Yes ☐ No ☐

Attach Community Immobilizer's Plan indicating solution, agreed with Owner/HH Head ☐ Done

C. INCOME GENERATING TREES

Chainage of Dwelling from Km 0+000:……..+…….……..

Borrow Pit, Quarry, Spoil Dump ID#.....

Tree	No. Trees	Age	Av DBH*	Av Height	Kip per Tree	Total
1. Teak						
2. Banana						
3. Mango						
4. Tamarind						
5. Coconut						
6. Other (Specify)						
Total	Kip……..					

(DBH*= Diameter at Breast Height)

Total Compensation for Agricultural Losses Kip……

SUMMARY RESETTLEMENT INFORMATION

1. MOVABLE STRUCTURES KIP
2. PERMANENT STRUCTURES KIP
3. AGRICULTURAL LOSSES KIP

TOTAL HH COMPENSATION KIP

Day:……. **Day:…….** **Day:…...….**

Head of Village **Interviewee** **Interviewer**

APPENDIX B

Total of population lives along the Rehabilitation of National Road 13N from Both Districts, Oudomxai Province

Item	District	Village	HH	Population	Female	Male
1	**Xai District**					
1.1	Xai	Navanhnoi	237	1,391.00	700	691
1.2	Xai	Vanghai	250	1,141.00	725	416
1.3	Xai	Homsouk	352	2,234.00	1,236	998
1.4	Xai	Lak4	215	1,299.00	648	651
1.5	Xai	Homxai	139	886.00	446	440
1.6	Xai	Lak10	107	599.00	299	300
1.7	Xai	Kornoi	204	1,020.00	471	549
1.8	Xai	Huayta	86	493.00	243	250
1.9	Xai	Lak22	61	420.00	220	200
Sub-Total		9	1,651	9,483	4,988	4,495
2	**Namo District**					
2.1	Namo	Nambortakai	55	281.00	143	138
2.2	Namo	Kulong	67	379.00	202	177
2.3	Namo	Kiewchap	69	391.00	193	198
2.4	Namo	Nathong	132	720.00	379	341
2.5	Namo	Namveuntai	88	503.00	254	249
2.6	Namo	Huayon	285	2,112.00	833	1,279
2.7	Namo	Homxai	242	1,458.00	759	699
2.8	Namo	Namsea	100	553.00	266	287
2.9	Namo	Natong	55	326.00	145	181
2.1	Namo	Namotai	78	447.00	222	225
2.11	Namo	Pangdou	64	361.00	182	179
2.12	Namo	Tungthong	145	958.00	485	473
2.13	Namo	Nampheng	68	389.00	186	203
2.14	Namo	Nahom	112	834.00	402	432
Sub-Total		14	1,560	9,712	4,651	5,061
Grant Total		**23**	**3,211**	**19,195**	**9,639**	**9,556**

APPENDIX C

Compensation Standards

Categories	Impact Items	Compensation Rate (US$)
C-1: Compensation Standards for Houses and Attachments (National Road 1B, 2008)		
Houses and Attachment	Brick Concrete Structures	$45/m2
	Wooden Structures	$30/m2
	Rice Storage(wooden 12 units)	$18/m2
	Rice Storage(bamboo 10 units)	$10/m2
	Fence	$1/meter
Affected Shops	Concrete Structures	$25/m2
	Wooden Structures	$20/m2
Permanent Land Acquisition	Paddy Land	$3 /m2
	Fish Pond & Garden Land	$3 /m2
	Housing Land	$5 /m2
Moving Allowance	House Relocation Moving Allowance	$30 per HH
	Shops Moving Allowance	$30 per HH
	Shop Business Loss	$750 per HH
	Gasoline Station Moving Allowance	$20 per shop
	Gasoline Business Loss Compensation	$100 per station
Attachments and Facilities	Electrical Tower	$450 per Tower
	Trees	$25 per piece
	Water Tap	$60 per piece
	Water Pipelines	$500 per km
C-2: Compensation Standards for Houses and Attachments (National Road 6A, 2009)		
Houses and	Concrete Structures	$40/m2

Attachment	Concrete Wooden Structures	$35/m2
	Wooden Structures	$30/m2
Affected Shops	Concrete Structures	$25/m2
	Wooden Structures	$20/m2
Permanent Land Acquisition	Paddy Land	$3 /m2
	Fish Pond & Garden Land	$3 /m2
	Housing Land	$3 /m2
Moving Allowance	House Relocation Moving Allowance	$30 per HH
	Shops Moving Allowance	$30 per HH
	Shop Business Loss	$300 per HH
Attachments and Facilities	Electricity pole	$450 per pole
	Trees	$25 per piece
	Fence	$5 per meter

APPENDIX D

Technique Standards

TABLE 2-3 . TENTATIVE AMBIENT WATER QUALITY STANDARDS FOR FRESH SURFACE WATERS

PARAMETER	UNIT	Standard Value for Class 1	2	3	4	5	STAT.	ANALYTICAL METHOD
Eutrophication		❶	❶	❶	❶	❶		Observation/Comparisons
Temperature	deg C	❷	❽	❺	❺			Thermometer
Color, Odor, Taste		❷	❺	❺	❺			Taste/Odor Panel
pH		❷	5-9	5-9	5-9			pH Meter
Dissolved Oxygen	mg/l	❷	> 6	> 4	>2		❶	Azide Modification
BOD (5-day, 20o C)	mg/l	❷	1..5	2	4		❺	Azide Modification
Coliform Bacteria: Total / Fecal	MPN/ 100 ml	❷	5,000 / 1,000	20,000 / 4,000			❺ ❺	Multiple Tube Fermentation
Nitrate Nitrogen (NO3-N)	mg/l	❷	10	20	30		❻	Cadmium Reduction
Nitrite Nitrogen (NO2-N)	mg/l	❷	5	5	5			
Ammonia Nitrogen (NH3-N) (un-ionized NH3): pH < 7.5 / pH > 7.5	mg/l / mg/l	❷	0.06 / 0.4	0.06 / 0.4	0.2 / 0.8		❻	Distillation Nesslerization
Total Dissolved Solids	mg/l	1,000	1,000	1,500	1,500			
Phenols	ug/l	❷	5	5	5		❻	Distillation, 4-Amino antipyrine
Boron	mg/l	❷	2	2	2		❻	
Oil and Grease	mg/l	❷	2	5	5	10	❻	
Copper (Cu)	mg/l	❷	0.1	0.1	0.1		❻	Atomic Absorption - Direct Aspiration
Nickel (Ni)	mg/l	❷	0.1	0.1	0.1		❻	
Manganese (Mn)	mg/l	❷	1	1	1		❻	
Zinc (Zn)	mg/l	❷	1	1	1		❻	
Cadmium (Cd)	ug/l	❷	5 ❸ / 50 ❼	5 ❸ / 50 ❼	5 ❸ / 50 ❼		❻	
Hexavalent Chromium	ug/l	❷	50	50	50		❻	
Lead (Pb)	ug/l	❷	50	50	50		❻	
Total Mercury (Hg)	ug/l	❷	2	2	2		❻	Atomic Absorption - Cold Vapor Technique
Arsenic (As)	ug/l	❷	10	10	10		❻	Atomic Absorption - Gaseous Hydride
Cyanide (CN)	ug/l	❷	5	5	5		❻	Pyridine-Barbituric Acid
Radioactivity: Gross Alpha / Gross Beta	Becquerel	❷	0.1 / 1.0	0.1 / 1.0	0.1 / 1.0		❻	Low Background Proportional Counter
Organophosphate Pesticides	ug/l	❷	50	50	50		❻	
Organochlorine Pesticides	ug/l	❷	2	2	2		❻	Gas Chromatography
DDT	ug/l	❷	1.0	1.0	1.0		❻	
Alpha BHC	ug/l	❷	0.02	0.02	0.02		❻	
Dieldren	ug/l	❷	0.1	0.1	0.1		❻	
Aldrin	ug/l	❷	0.1	0.1	0.1		❻	
Heptachlor and Heptachlor Epoxide	ug/l	❷	0.2	0.2	0.2		❻	
Chlordane	ug/l	❷	❷	❷	❷		❻	

Legend:
Class 1 = Unpolluted water supply safe for human consumption without treatment; provides habitat for sensitive aquatic biota and body contact recreation.
Class 2 = Water supply safe for human consumption after normal treatment process; habitat for biota and suitable for recreation and aquatic biota.
Class 3 = Medium quality water suitable for human consumption after normal treatment process, irrigation supply, and aquatic biota.
Class 4 = Somewhat polluted water used for human consumption only after special treatment and for industrial supply.
Class 5 = Polluted fresh water suitable for navigation.

Notes:
❶ = no objectionable growth of aquatic life.
❷ = natural background condition
❸ = maximum change of 3° C from natural background condition
❹= Only 20 percent of the samples can be less than the standard
❺ = 80 percent of the samples must be less than the standard
❻ = When water hardness as calcium carbonate is less than 100 mg/l
❼ = When water hardness as calcium carbonate is more than 100 mg/l
❽ = Maximum allowance

TABLE 2-4. TENTATIVE SOIL STANDARDS[20] FOR TYPES OF LAND USE[21] (mg/kg)

PARAMETER	CHILDREN'S PLAYGROUND	RESIDENTIAL, PARKS, & AGRICULTURAL AREAS	INDUSTRIAL/ COMMERCIAL AREAS
TDS[22] of soil extract	750	750	750
pH of soil extract (units)	6-8.5	6-8.5	6-9
Nitrate Nitrogen	40	50	60
Total Petroleum Hydrocarbons	100	250	1000
Benzene	0.01	0.03	0.3
Toluene	0.05	0.15	1.5
Ethylbenzene	0.05	0.15	1.5
Xylenes	0.05	0.15	1.5
Styrene	0.1	0.3	3
Aromatics (total)	0.1	1	10
Arsenic	20	25	30
Cadmium	1	1	10
Chromium	100	200	400
Copper	50	75	150
Lead	50	100	200
Nickel	50	80	180
Zinc	200	300	500
Mercury	0.5	0.5	2
PCBs (total)[23]	0.05	0.05	1
Chlorobenzenes (ind)	0.05	0.05	1
1,2-benzopyrene	0.05	0.05	1
Naphthalene	0.1	1	10
Benzo(a)pyrene	2	4	12
Organo-Chlorine Pesticides (total)	30	50	50

[20] Standards are maximum values not to be exceeded expressed in mg/kg of dry matter.
[21] These standards are adapted from the current Dutch and German system wherein the values noted are believed to be the maximum allowable to protect beneficial uses for the listed land-use.
[22] Total dissolved solids.
[23] Polychlorinated biphenyls.

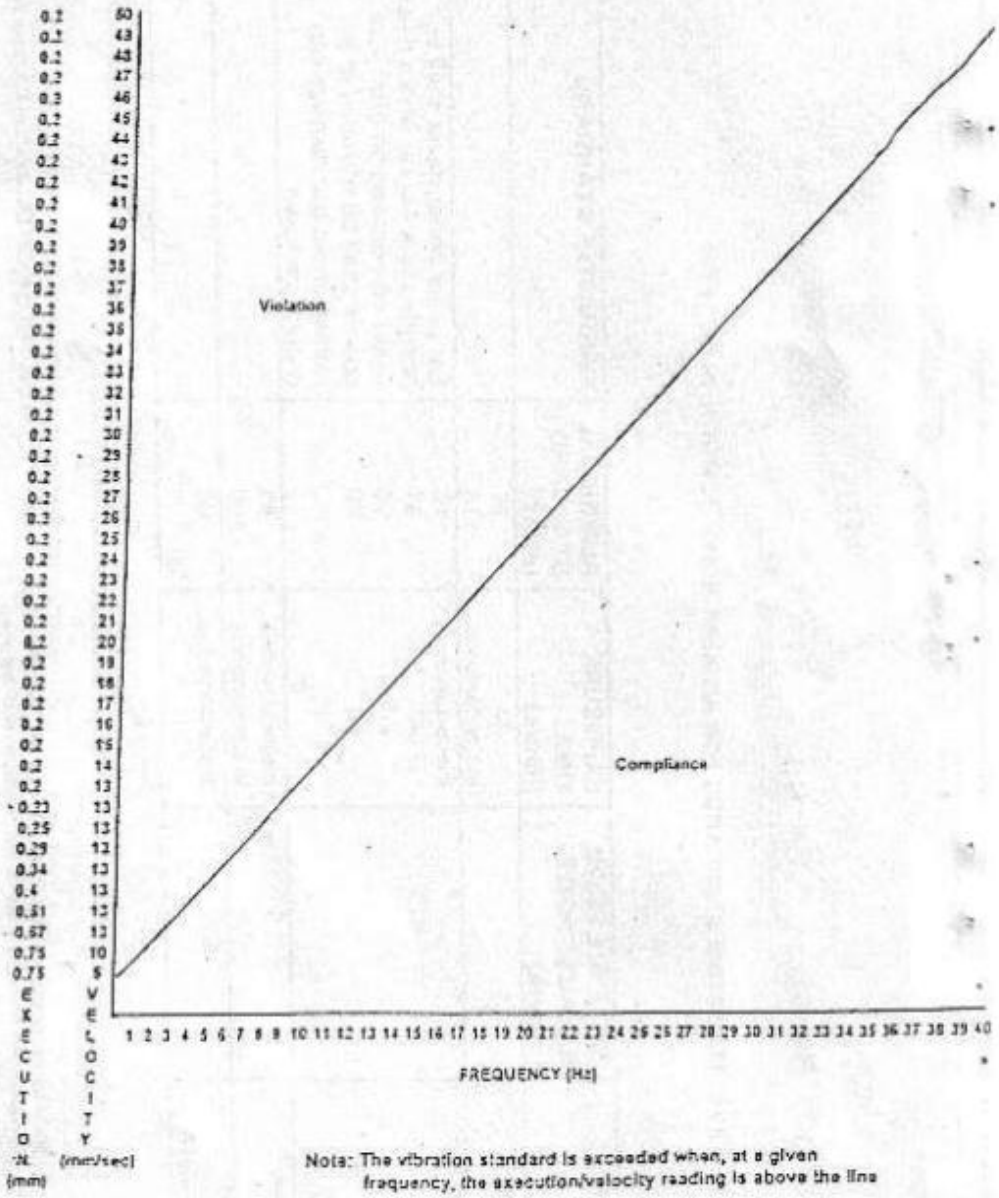
TABLE 2-5 . TENTATIVE STANDARDS FOR AMBIENT NOISE CONTROL IN LAO PDR

PARAMETER	DISTANCE FROM EXHAUST PORT (meters)	EXPOSURE TIME (hours)	NUMERICAL STANDARD (dBA)[24]	NARRATIVE STANDARD
Ambient Noise[25]:	- -	24 Instantaneous	70 115	
Workplace Noise[26]:	- - - -	Instantaneous <7 7-8 >8	140 91 90 80	Ear plugs or ear muffs shall be provided to a worker where noise levels can exceed 80 dBA; Ear guards shall be provided to a worker where ear damage can occur from noise.
Motor Vehicles[27]:	7.5 0.5	Instantaneous Instantaneous	85 100	
Motor Boats[28] (Diesel Engines)	0.5	Instantaneous	100	

[24] Units of noise in decibles as measured with a sound level gauge meeting the standards of the International Electrotechnical Commission (IEC).
[25] All sources that contribute to the noise level at the measurement location.
[26] At any location within a project site, including adjacent to machinery.
[27] Measurement shall be done while vehicle is stationary with engine RPM as follows:
- Diesel Engine = maximum RPM
- Gasoline Engine = ¾ of maximum RPM
- Motorcycle = ½ of maximum RPM if maximum RPM > 5000
  = ¾ of maximum RPM if maximum RPM < 5000

[28] Measurement shall be done while boat is stationary with maximum engine RPM.

TABLE 2-6 . STANDARDS FOR CONTROL OF VIBRATION IN LAO PDR



Note: The vibration standard is exceeded when, at a given frequency, the execution/velocity reading is above the line

Table 3. Minimum Information to be Contained in a Project Description

- Name of project owner
- Project type and purpose
- Project size in terms of land, floor space, product amounts, etc.
- Project location
- Intended product(s)
- Raw materials to be used
- Estimate of the quantity and quality of any solid, liquid, or air-borne wastes resulting from project construction or operation
- Source of intended labor force for construction and operation (number and origin)
- Anticipated positive and negative environmental (including socio-economic) aspects of the project.
- Environmental protection measures that would be implemented during project construction, operation, and closure (if applicable).

TABLE 5. FRAMEWORK TOR FOR CONDUCT OF EIA

Detailed Project Information:

- problem or development goal
- proposed solution
- cooperation among donors, lenders, and the developing country
- objectives of the assessment
- legal and policy considerations
- institutional capacity
- alternatives to the project and within the project
- institutional cooperation, and
- public involvement

Detailed Environmental Assessment Information:

- project description
- description of the environment
- information quality
- positive impacts
- negative impacts on natural resources, human resources, resettlement and compensation, cumulative impacts, trans-boundary impacts, and impact significance
- mitigation measures
- environmental management plan
- environmental monitoring plan

TABLE 6. GENERAL CONTENTS AND FORMAT FOR AN EIA REPORT

1. Summary
2. Introduction
   - Names and addresses of the project owner and Development Project Responsible Agency
   - Name, address, and affiliation of the report author
   - Purposes of the project
   - Institutional framework, including relevant laws, treaties, and regulations
3. Description of the environment in the project area (baseline data)
   - Physical
   - Flora and fauna
   - Environmentally-sensitive areas on and near the site
   - Economic
   - Social
4. Identification and evaluation of reasonable alternatives for achieving the project purposes
5. Direct and indirect significant environmental impacts (SEIs) including cumulative impacts of each alternative
   - during project construction phase[19]
   - during project operation phase
   - during project closure phase
   - Compliance of the alternative with applicable laws, regulations, treaties, and land-use or watershed management plans
6. Record of public involvement activities
7. Identification of the chosen alternative and reasons for choosing the alternative
8. Detailed description of the chosen alternative (i.e. "the project")
   - Schedule of project activities
   - Construction and operation
   - Construction cost
   - Environmental economic evaluation (environmental benefits and losses)
   - Project risks to social structure, natural resources, and public health and safety
9. Environmental Management Plan to prevent or reduce SEIs
   - Measures for physical resources
   - Measures for flora and fauna
   - Measures for socio-economic impacts
   - Compensation measures (if any)
   - Environmental monitoring and evaluation
   - Training program for EMP implementation
   - Implementation responsibilities and schedules
   - Implementation responsibilities and schedules
   - Budget for EMP implementation
10. References
11. Appendices

[19] Includes the pre-construction phase

TABLE 7 OUTLINE OF AN ENVIRONMENTAL MANAGEMENT PLAN:

PHYSICAL ENVIRONMENT

Project Phase	SEI	Environmental Protection Measure	Implementation Responsibility	Implementation Schedule	EPM Cost (US$)
Design					
Construction					
Operation					

BIOTA ENVIRONMENT

Project Phase	SEI	Environmental Protection Measure	Implementation Responsibility	Implementation Schedule	EPM Cost (US$)
Design					
Construction					
Operation					

SOCIO-ECONOMIC ENVIRONMENT

Project Phase	SEI	Environmental Protection Measure	Implementation Responsibility	Implementation Schedule	EPM Cost (US$)
Design					
Construction					
Operation					

TABLE 8. CONTENTS OF AN ENVIRONMENTAL MONITORING REPORT FOR ROAD PROJECTS[17]

1. Summary of the environmental effects of the project to date predicted during project planning
2. Summary of the environmental effects which have been measured or observed to date
3. Project's compliance with environmental design specifications and environmental standards
4. Results of the most recent monitoring period:

Physical/Chemical Parameters	Biota Parameters	Socio-Economic Parameters
-turbidity, suspended solids, & settleable solids in rivers along the right-of-way before, during, and after construction both in the dry season and during intense rainfall events. -measurement of background noise and air particulates in communities along the right-of-way before, during, and after construction. -inspection of work areas and asphalt plants during construction to determine hydrocarbon spills; sample soil at various depths and analyze for petroleum hydrocarbons and solvents if there is evidence of spillage. -during construction, inspect fuel storage facilities to determine if hydrocarbon leakage is occurring, and if berms or other means are provided to contain spills. -during construction and operation, inspect drainage channels adjacent to right-of-way for sedimentation.	- number and types of wildlife (animals and birds) observed at representative locations in the right-of-way before, during, and after construction.	- before construction, record number and location of people along right-of-way, near quarries, and work areas that could be harmed by project activities. -during construction, interview sample populations along the right-of-way to record any complaints including economic impacts, noise, dust, or traffic delays or hazards. -inspect sanitary facilities and solid waste collection at work camps to determine proper maintenance. -test drinking water supplies for coliform bacteria and nitrates (see Table 2-2 for safe levels). -record (a) accidents to work force, (b) clinic visits by workforce, and (c) number of worker sick days during the monitoring period. -inspect right-of-way during the wet season to note any slumps or slides that could encroach on the roadway.

5. Recommended adjustments to project activities, if any, and rationale for the recommendation
6. Recommended adjustments to the monitoring program, if any, and rationale for the recommendation
7. Other observations, recommendations, and conclusions

[17] This table is adapted from "Guideline for Reducing the Environmental Effects of Road Projects in Lao PDR People's Democratic Republic" issued by Prime Minister's Decree No. 05/PM dated 14/1/95.

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