SOCIO-ECONOMIC IMPACTS OF THEUN-HINBOUN HYDROPOWER PROJECT ON RECIPIENT RIVER COMMUNITIES, LAO PDR

AMPHAI DARASOUK

MASTER OF SCIENCE

PROGRAM IN NATURAL RESOURCES AND ENVIRONMENTAL MANAGEMENT

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THESIS SUBMITTED TO MAE FAH LUANG UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE PROGRAM IN NATURAL RESOURCES AND ENVIRONMENTAL MANAGEMENT

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THIS THESIS HAS BEEN APPROVED

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ABSTRACT

This research aims to: (1) ascertain the main socio-economic impacts of the Theun-Hinboun Power Project (THPP) and the proposed Theun-Hinboun Expansion Project (THXP) to communities in recipient rivers areas; (2) study the mitigation and compensation programs committed by the project proponents to deal with these main impacts; (3) study and compare the Resettlement Action Plan (RAP) compensation packages provided by both the THPP and the THXP for impacted and relocated communities.

The results of the field surveys, literature reviewed and field observations were used to identify the main socio-economic impacts of THPP in recipient river communities. These impacts are: (1) frequency and long duration of floods leading to the loss of wet season rice crops and abandoned paddy land, (2) fish and aquatic life decline, (3) loss of access to clean water and drinking water shortage, and (4) loss of land for riverbank gardens due to riverbank erosion. The result of these impacts is that only 22% of the project affected persons (PAPs) in the recipient river communities have sufficient rice to eat for the whole year since the start of the THPP operation, The four impacted communities studied still have no access to electricity and remai

with poor access roads. The most affected of the four villages is Khen village followed by the Kengkot village due to the fact that these villages are located below the confluence of the Nam Hai River with the Nam Hinboun River. The THPC compensation and mitigation program to deal with these impacts was totally inadequate. As examples, the drinking water supply in Khen village failed and can not be used, three years of dry season rice practice for both Khen village and Kengkhot village were unsuccessful, and many households remain in debt to the saving and credit fund established by the project.

The proposed Theun-Hinboun Expansion Project will double the water discharge from the powerhouse to the Nam Hai River and Nam Hinboun River. These four villages will be affected by increased flooding, increased loss of land and water quality issues, and will require relocation to the Phoumakneng relocation site in the dry season of 2009. The objective of the THXP entitlements is to provide full compensation for all PAPs to ensure outcomes which are better than pre-project conditions.

The THXP mitigation and compensation packages planned for affected people from the existing project and from the proposed new project appear to be beneficial for livelihood improvement, but that plan was significantly delayed by documentation requirements and late availability of funds. The relocation facilities and services will not be completed prior to relocation of these families accept for residential land and primary schools. The dry season paddy land with irrigation system and other agriculture lands planned for are still pending (yet to be implemented). Therefore it can be concluded that these proposed packages are inadequate to restore livelihood and food security for recipient river communities in the first two years after relocation, but after that time, whether these packages will be successful or fail is dependent upon their timely implementation. This will be the proposed subject of future research to evaluate the adequacy and effectiveness of the implemented THXP program in the next four or five years.

Keywords: Socio-economic Impact/Hydropower Project/Recipient River Community

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
DU	Downstream Unit
EIA	Environment Impact Assessment
EMD	Environmental Management Division
EMMP	Environmental Management and Monitoring Plan
FIVAS	Association for International Water Studies
Gol	Government of Lao PDR
HH	Household
IR	International River
IRN	International Rivers Network
Lao PDR	Lao People's Democratic Republic
MRC	Mekong River Committee
NGO	Non-Governmental Organization
PAP	Project Affect People
RAP	Resettlement Action Plan
SED	Social Developmental Division
STEA	Science, Technology and Environment Agency
SWECO	Swedish Environmental Consultants Company
THPC	Theun Hinboun Power Company
THHP	Theun Hinboun Hydropower Project
THPP	Theun Hinboun Power Project
THXP	Theun Hinboun Expansion Project
WCD	World Commission on Dams
WB	World Bank

CHAPTER 1

INTRODUCTION

1.1 Background

Dams have been built for hundreds of years to prevent flood waters, more recently to harness water as hydropower, to provide water supplies for communities and industry, and to irrigate agricultural crops and fields. By 1950, governments or in some countries the private sector, were building increasing numbers of dams as populations increased and national economies grew. At least 45,000 large dams have been built as a response to meet energy or water needs. Today, nearly half of the world's rivers have at least one large dam. More than 200 dams have been proposed to date for the Mekong River and its tributaries (MRC, 2001).

Lao PDR is well known as a country with abundant natural resources, especially forests, minerals and fresh water resources. These resources are considered most important 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 hydropower development for the generation of electricity, permitting the sale of electric power to neighboring countries as well as for electrification of all towns and rural villages throughout Lao PDR. Hydropower development in Laos is moving ahead rapidly because of the large potential for generation of electricity from hydropower projects throughout the Mekong basin and its tributaries. Hydropower is considered a preferred form of energy because the power source is renewable and water is a clean fuel as no earth warming gases are produced and no air pollution is generated from the production of electricity.

Since 1970 until now, Lao PDR has put into operation six hydropower projects, an another six projects are officially under construction. Additionally there are 16 projects in the preconstruction or advanced planning stages, and some 36 projects with MoUs signed. Six of these projects are proposed for construction in the Mekong mainstream in Laos or along the Lao-Thai border areas (MRC, 2002).

Hydropower projects are known to cause both positive and negative impacts on the natural and socioeconomic environment (NORPLAN, 1996). It has been demonstrated that the 2positive impacts include people's accessibility to electricity, opportunities for local and national employment, and through employment on such projects better living conditions, improved housing, access to schools, health clinics, markets, and improved roads. The project proponents (or project owners) and the Lao host government have interests in developing hydropower to gain such a long-term benefits from hydropower projects. A main objective of the Lao development policy is to reduce poverty and hydropower projects will provide much needed revenues for the Lao government to achieve its goal of removing Laos from the list of impoverished nations by the year 2020.

Negative impacts from hydropower projects include both impacts to people and to the environment. Impacts affecting people include involuntary resettlement of villagers from their ancestral lands, loss of access to forests and their traditional non-timber forest products, loss of forests due to clearance of lands for project construction and from flooding of the reservoir, lost of biodiversity both in the lost forest and in the river system changes, and a significant reduction of fish species and aquatic life.

Many significant impacts occur during the construction phase of these projects, including land changes, loss of agricultural production, pollution from construction wastes, both hazardous and non-hazardous wastes, air and water pollution from transport and construction activities, impacts from worker camps, including health issues and spread of sexual transmitted diseases due to the influx of a large number of workers and induced public services. A large effort must be made by project proponents to mitigate the social and environmental impacts resulting from development of hydropower projects and to incorporate social action plans and environmental management and monitoring plans as part of their development activities.

1.2 Rational

Theun-Hinboun Power Project (THPP) as one of the largest hydropower project located in central part of Laos and is a good example of the socio-economic impacts to local people who live in recipient rivers area. The four villages (Nasakong, Phakonlo, Kengkhot and Khean) located in recipient river were selected for this study because these villages have been negatively affected by the THPP since dam operation in 1998.

Villagers have experience with natural flooding for several years before the dam operation but the THPP caused flooding more often due to the transfer of waters from the Nam Theun basin to the Nam Hai and Nam Hinboun River Basin (FIVAS, 2007). The proposed Theun-Hinboun Expansion Project (THXP) will increase water flows into Nam Hai River and Nam Hinboun River from 110 m^3/s to 220 m^3/s and will therefore increase the flooding area in the wet season over a wider range and with more frequency. That result has prompted THXP to mitigate the impacts by moving (relocating) impacted households to higher elevation ground with a new compensation package.

The four villages as the first relocation target group will be relocated in the Phoumakneng relocation area in this dry season 2009-2010. Nasakong Village will be a hosted village in that relocation site.

Since the start of the THPP operations to present time, a wide range of impacts have been reported from project operation by international NGOs. These NGOs have always claimed that the Theun Hinboun Power Company (THPC) has provided inadequate compensation for all affected people. International Rivers Campaigns Director, Ms. Aviva Imhof, said in April 2008 that the relocation area, both host villagers and relocated communities, will be forced to compete for increasingly scarce land and natural resources, with a consequent lowering of living standards for all involved. The study of socio-economic impacts before relocation will help to clarify and understood the current situation of these communities. The results of the study will serve as a lesson learned for many communities which will be affected by a number of developing hydropower projects in the Lao PDR.

1.3 Research Questions

1. What are the main socio-economic and impacts from the THPP to communities in recipient rivers area?

2. What are the differences between the old compensation program for impacted people from THPP and the new compensation package provided by the THXP for impacted and relocated communities?

3. Are the proposed mitigation measures and compensation package adequate to restore livelihood and food security for recipient river communities?

1.4 Research Hypothesis

The following hypothesis is assumed to be the basis for the socio-economic impacts caused by both the THPP and the proposed THXP:

The proposed mitigation measure and compensation package are adequate to restore livelihood and food security for relocate communities.

1.5 Objectives

The general objective of this study aims to study the current situation in recipient rivers communities and evaluate the THXP compensation packages for relocated communities.

The specific objectives of this study are:

1. To identify the main socio-economic impacts of the THPP and proposed THXP in recipient rivers communities.
2. To analyze the mitigation and compensation programs to deal with the main impacts of THPP.
3. To compare the RAP compensation packages provided by THPC for impacted villages and relocated communities.

1.6 Scope

This research will focus on the socio-economic impacts of the THPP to recipient rivers communities and the THPC mitigation and compensation program to deal with those impacts, the villagers' attitudes towards relocation, and an evaluation of the proposed THXP compensation package for relocated communities.

The study area includes four villages: Nasakong village, Phakolko village, Kengkhot village and Khen village located in the Hinboun District, Khammouane Province, Lao PDR.

1.7 Conceptual framework

Conceptual framework of this study is illustrated in the diagram, as shown below:

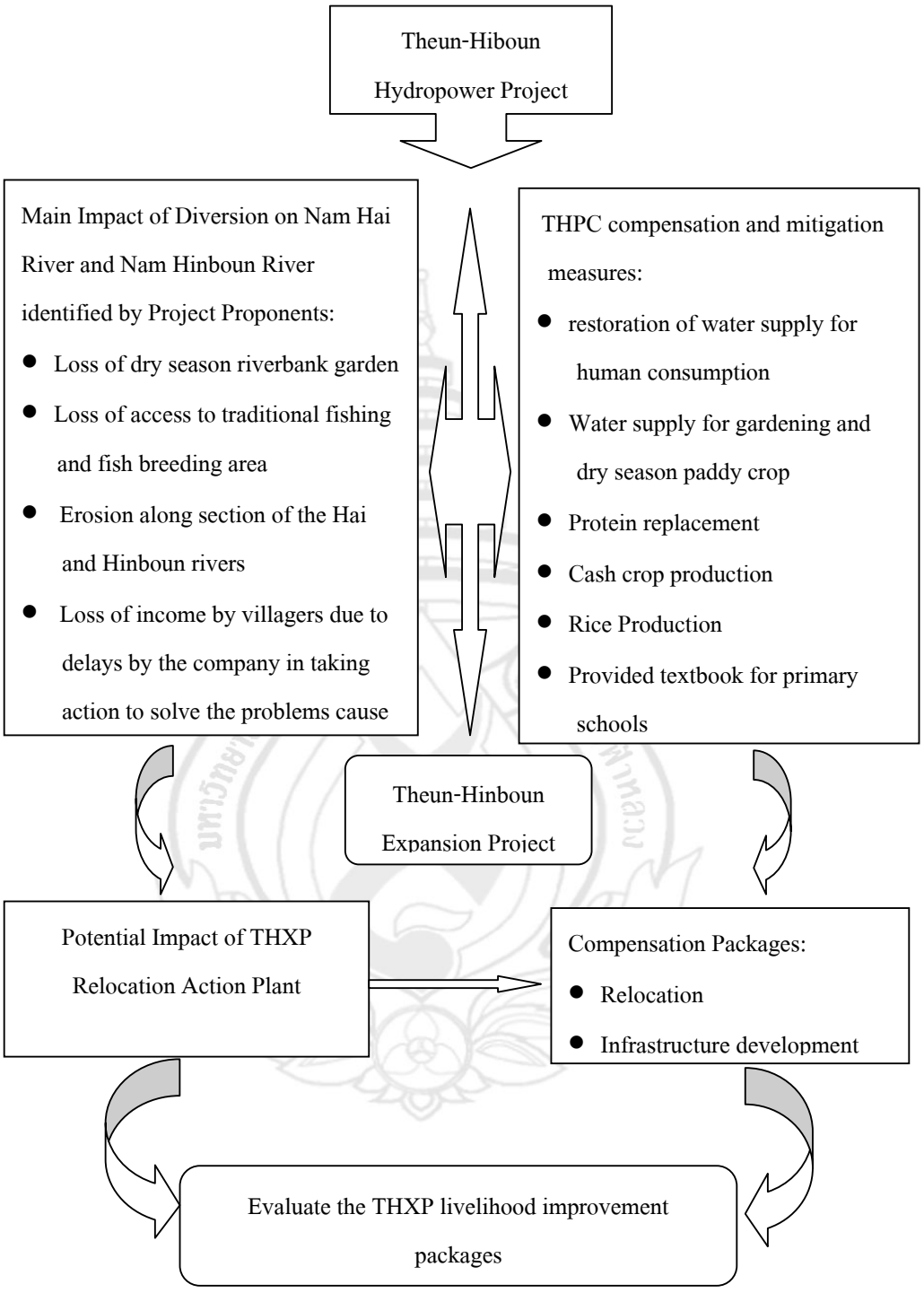


Figure 1.1 Conceptual framework diagram

CHAPTER 2

LITERATURE REVIEWS

A review of the literature on dams, hydropower projects, and sustainable development has been useful to identify the research objectives and the research methodologies that will be applied to arrive at lessons learned and conclusions. This research will use theory and applied research methods to carry out the study process. These methods are outlined below:

2.1 Sustainable development

Sustainable development is explored as part of new efforts, albeit tentative, to integrate environmental, economic and (more recently) social considerations into a new development paradigm (Baker, 2006).

Sustainable development is a process of change in which the exploitation of resources, the direction of investment, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations (WCED, 1987, p. 46).

Sustainable development is about enhancing human well-being through time. What constitutes a good life is highly subjective, and relative importance accorded to different aspects of well-being varies for individuals, societies, and generation (World Development Report, 2003)

2.2 Dams

Through much of the last century, dams were seen as a symbol of industrial progress, of man's ability to tame rivers, and harness nature. Dams symbolized various kinds of power political, economic, social, and electrical development. For many governments, building large dams were perceived as a demonstration of their nation's strength. The result of that more than half the world's major rivers are now affected by dams and an estimated minimum 40 million people have had to move out from their lands to make room for the reservoirs and power plants (MRC, 2001).

2.2.1 Advantages

Dams are usually built for more one of the following engineering and socio-economic purposes:

1. To generate electricity for domestic and industrial consumption, and\or for export to obtain income from foreign sources. Electric power is essential for industrial development to raise community standards of living.

2. To store water for irrigation of farmland to improve crop yields and increase the security of food supply.

3. To control water level during times of high river flow to prevent flooding downstream and for release during low-flow periods.

Additional advantage of dams can potentially include:

1. Rural electrification and development

2. Job creation during dam construction and in subsequent industrial and community development

3. Expansion of social services and improved infrastructure in the region served by the dam, for example schools, hospitals and roads

4. Fishing and recreational potential of reservoirs (MRC, 2002).

2.2.2 Disadvantage

Too often, the benefits of dams have been less than those that were promised and adverse effects far greater than anticipated. In many cases, impacts on the environment and on people displaces by dam development have been far worse than project proponents had stated. Often, economic benefits take place far from the dam site, while local communities, indigenous people, and other vulnerable groups are forced into worse living conditions than before the development even before a dam is put into operation, construction cost and timeframes often have been far greater than scheduled, due to a multiplicity of unforeseen, unplanned, or ignored problem. The delays cost money and shake the confidence of financiers, potential customers, and local communities (MRC, 2002).

After a dam is in operation, adverse environmental and socio-economic impacts often have exceeded the predictions of dam proponents, with many unwanted results. For example, irrigation can cause increases in soil salinity that reduce rather than increase crop yields. Dams drastically affect aquatic and terrestrial components of ecosystems by cutting of the downstream flow of a river from its source, and inundating areas that were occupied by humans and animals. The loss of aquatic and terrestrial habitats results in population decreases or localized extermination of plant and animal species (WCD, 2000).

2.2.3 The Downstream Impacts of Dams

The social impacts of dams in downstream environments tend to result from complex interactions between environmental impacts and economic impacts. Whereas in the case of resettlement, the environmental impact is simple (if drastic), downstream the impacts of the dam on people depends on a rather complex set of impacts on the amount and timing of water flowing in the river and on the hydrological link between river and floodplain. Where dependence of downstream communities on economic activities dependent on river flows, social impacts reflect ecological impacts closely. The link between social impacts, floodplain economy and dam's environmental impacts are not widely understood. The discussion in the section therefore attempts to explain these linkages, making clear not only the nature and significance of downstream social impacts, but also their enormous complexity (William, 2000).

2.2.4 Social Impacts of Large Dams

In terms of the social impacts of dams, the Commission on Dams (WCD, 2000) found that the negative effects were frequently neither adequately assessed nor accounted for. The range of these impacts is substantial, including impacts on the lives, livelihoods and health of the affected communities dependent on the riverine environment. The Commission concluded that:

1. About 40-80 million people have been physically displaced by dams worldwide

2. Millions of people living downstream from dams - particularly those reliant on natural floodplain function and fisheries - have also suffered serious harm to their natural floodplain function and fisheries - have also suffered serious harm to their livelihoods and the future productivity of their resources has been put at risk

3. Many of the displaced were not recognized (or enumerated) as such, and therefore were not resettled or compensated

4. Where compensation was provided it was often inadequate, and where the physically displaced were enumerated, many were not included in resettlement programs.

5. Those who were resettled rarely had their livelihoods restored, as resettlement programs have focused on physical relocation rather than the economic and social development of the displaced

6. The larger the magnitude of displacement, the less likely it is that even the livelihoods of affected communities can be restored

7. Even in the 1990s, impacts on downstream livelihoods were, in many cases, not adequately assessed or addressed in the planning and design of large dams (WCD, 2000).

In addition, large dams in the “Knowledge Based” have also had significant adverse effects on cultural heritage through the loss of cultural resources of local communities and the submergence and degradation of plant and animal remains, burial sites and archaeological monuments (WCD, 2000). The “Knowledge Based” indicated that the poor, other vulnerable groups and future generations are likely to bear a disproportionate share of the social and environmental costs of large dam projects without gaining a commensurate share of the economic benefits.

1. Indigenous and tribal peoples and vulnerable ethnic minorities have suffered disproportionate levels of displacement and negative impacts on livelihood, culture and spiritual existence.

2. Affected populations living near reservoirs as well as displaced people and downstream communities have often faced poor health and lower livelihood outcomes from environmental change and social disruption

3. Among affected communities, gender gaps have widened and women have frequently borne a disproportionate share of the social costs and were often discriminated against in the sharing of benefits

Where such inequities exist in the distribution of the costs and benefits, the Global Review (WCD, 2000) emphasizes that the “balance-sheet” approach to adding up the costs and benefits is increasingly seen as unacceptable on equity grounds and as a poor means of choosing the 'best' projects. In any event, the true economic profitability of large dam projects remains elusive, as the environmental and social costs of large dams were poorly accounted for in economic terms.

More to the point, failures to account adequately for these impacts and to fulfill commitments that were made have led to the impoverishment and suffering of millions, giving rise to growing opposition to dams by affected communities worldwide. Innovative examples of processes for making reparations and sharing project benefits are emerging that provide hope that past injustices can be remedied and future ones avoided (WCD, 2000).

2.3 Regulation of Implementing Decree on Compensation and Resettlement of People Affected by Development Projects (Lao PDR)

This regulation conducted by the Science, Technology and Environment Agency was first published in 2006 (almost 10 years after the start of THPP but before the approval of the THXP). The objective of the regulation is to implement the Decree on Compensation and Resettlement No 192/PM, dated 7 July 2005 and to have project proponents strictly and properly comply with the technical guidelines for compensation and resettlement issued in November

2005. The regulation includes 11 parts with 37 articles. The article 4 stipulated the following obligations of agencies causing adverse social impacts:

1. In collaboration with the concerned local governmental authorities and concerned organizations, carry out necessary surveys and field investigations, identify affected communities, prepare inventory of impacts by types and degree, and determine entitlement to mitigation measures including compensation for affected assets. Project owners must provide appropriate funding to assist, support, relocate Action Plans and to implement income rehabilitation measures and to prepare necessary in an efficient and timely manner and approved by the concerned agencies to ensure the improvement of their socio-economic situation;

2. Make every attempt so that displacement and other direct adverse impacts on peoples' assets and income are avoided or if unavailable, minimized by examining all design options available to the project;

3. Be responsible for the timely provision of adequate budget for all aspects of planning, implementing, monitoring and evaluating all resettlement and compensation activities;

4. Pay particular attention to the needs of the poorest affected people, and vulnerable groups that maybe at high risk of impoverishment. Appropriate assistance much be provided to help them improve their social and status; and

5. Ensure that the resettlement process is carried out through a meaningful involvement of project-affected communities, and their existing socio and cultural institutions are supported to the greatest extent feasible (STEAR, 2006).

2.4 World Bank Policy, Objectives for Involuntary Resettlement

The objective of the World Bank resettlement policy is to ensure that the population displaced by a project receives benefits from it. Involuntary resettlement is an integral part of project design and should be dealt with from the earliest stages of project preparation taking into account the following policy considerations:

1. Involuntary resettlement should be avoided or minimized where feasible, exploring all viable alternative project designs. For example, realignment of roads or reductions in dam height may significantly reduce resettlement needs.

2. Where displacement is unavoidable, resettlement plans should be developed. All involuntary resettlement should be conceived and executed as development programs, with resettlers provided sufficient investment resources and opportunities to share in project benefits. Displaced persons should be (i) compensated for their losses at full replacement cost prior to the actual move; (ii) assisted with the move and supported during the transition period in the resettlement site; and (iii) assisted in their efforts to improve their former living standards, income earning capacity, and production levels, or at least to restore them. Particular attention should be paid to the needs of the poorest groups to be resettled.

3. Community participation in planning and implementing resettlement should be encouraged. Appropriate patterns of social organization should be established, and existing social and cultural institutions of resettle sand their hosts should be supported and used to the greatest extent possible.

4. Resettlers should be integrated socially and economically into host communities so that adverse impacts on host communities are minimized. The best way of achieving this integration is for resettlement to be planned in areas benefiting from the project and through consultation with the future hosts.

5. Land, housing, infrastructure, and other compensation should be provided to the adversely affected population, indigenous groups, ethnic minorities, and pastoralists who may have usufruct or customary rights to the land or other resources taken for the project. The absence of legal title to land by such groups should not be a bar to compensation" (World Bank, 2002).

2.5 ADB Policy on Involuntary Resettlement

The ADB policy on involuntary resettlement (2006) outlines the main issues of relocation, compensation and rehabilitation, drawing on the experiences of many donors implementing and evaluating resettlement programs. Tree important element of the policy is:

1. compensation to replace lost assets, livelihood and income;

2. assistance for relocation, including provision for relocation site with appropriate facilities and services; and

3. Assistance for rehabilitation to achieve at least the same level of well-being with the project as without it.

The following principles have to be taken into account for any project with involuntary resettlement and requiring ADB financial support.

1. Involuntary resettlement should be avoided whenever feasible.

2. Where population displacement is unavoidable, it should be minimized by providing viable livelihood options.

3. Replacing what is lost. If individuals or a community much lost all or part of their land, means of livelihood, or social support systems, so that a project might proceed, they will be compensated and assisted through replacement of land, housing, infrastructure, resources, income resources, and services, in cash or in kind, so that their economic and social circumstances will be at least restored to the pre-project level. All compensation is based on the principle of relocation cost.

4. Each involuntary resettlement is conceived and executed as part of the development project or program. ADB and executing agencies of project sponsors, during project preparation, assess opportunities for affected people to share project benefits. The affected people need to be provided with sufficient resources and opportunities to re-establish their livelihoods and homes as soon as possible, with time-bound action in coordination with the civil works.

5. The affected people are to be fully informed and closely consulted. Affected people are to be consulted on compensation and/or resettlement options, including relocation sites, and socio-economic rehabilitation. Pertinent resettlement information is to opportunities provided for them to participate in choosing planning, and implementation options. Grievance redress mechanisms for affected people are to be established. Where adversely affected people are particularly vulnerable groups, resettlement planning decisions will be preceded by a social preparation phase to enhance their participation in negotiation, planning, and implementation.

6. Social and cultural institutions. Institutions of the affected people, and, where relevance, to their hosts, are to be protected and supported. Affected people are to be assisted to integrate economically and socially into host communities so that adverse impacts on the host communities are minimized and social harmony is promoted.

7. Indigenous groups, ethnic minorities, pastoralists, people who claim for such land without formal legal rights, and others, who may have usufruct or customary rights to affected land or other resources, often have no formal legal title to land is not a bar to ADB policy entitlements (ADB, 2006).

2.6 Information about THHP and THXP

2.6.1 Theun-Hinboun Power Project Description

The Theun-Hinboun Power Project (THPP) is a 210 MW trans-basin hydropower project, located on the Nam Theun River, one of the largest tributaries of the Mekong River in Lao PDR. THPP is the first of several large hydropower projects constructed in Lao PDR. This dam diverts water of 110m3/s (cubic meters per second) out of the Nam Theun River into the Nam Hai River and Nam Hinboun River Basin, which finally flows to the Mekong River[1]. THPP was developed by the private sector as a joint venture company with the Government of Laos

[1] The Lao word for river is "*Menam*", but is abbreviated for contributaries of the Mekong River as "*Nam*" hence the names "*Nam Hai*" and "*Nam Hinboun*". In this thesis rivers will be referred to with the Lao names and include the prefix "*Nam*" before the name of the river, such as Nam Hai, meaning the Hai River. However, for the Mekong River, which is an international river, the English name "Mekong River" will be utilized.

(GoL). A joint venture was formed, called the Theun-Hinboun Power Company (THPC), under a Concession Agreement with the Lao Government in 1994 with a license period of 30 years. THPC is a Lao registered company 60% owned by Electricite` du Laos (EdL), 20% by GMS Power of Thailand, and 20% by Nordic Hydropower AB of Scandinavia. The project was launched in 1994, construction was completed four years later, and THPP was officially opened on April 4, 1998. The power project has continued to operate successfully (NORPLAN, 2007). THPP completed an Environmental Impact Assessment Report (EIA), prepared by NORPLAN A.S., Norway, before the Lao PDR had developed and approved an EIA regulation. The EIA/EMP underestimated the social and environmental impacts of the hydropower project to downstream communities and the natural environment. The study identified the potential impact of Diversion to the Nam Hai River and the Nam Hinboun River as described below:

The Nam Hai River and the Nam Hinboun River

The Nam Hai River plain and the lower Nam Hinboun River valley are the second sites affected by theTHPP project. The Nam Hai River plain is the location of the discharge point of diverted water from the Nam Theun River. Water from the Nam Hai River is then discharged into the Nam Hinboun River which flows down to the Mekhong River in the lower Nam Hinboun valley. Thus , these areas will experience an extra 110cu.m/sec. (m3/s) flow of water throughout the project's operating time during the year. Similar to the case of the head pond areas, there are positive and negative aspects of this increased flow diverted by the project to the downstream impacted communities living along the Nam Hai River plain and Nam Hinboun River.

One of the most outstanding phenomenons experienced in this area, over the last few years, is the severe flooding with heavy sedimentation. Rice crops have been wiped out totally in three of the last four years. According to the farmers, the damages to a the large extent, were from the quality of flood waters and the length of flooding. Rice can tolerate flooding for some time, but it cannot survive under the floods with high turbidity. In fact, the profile shows that farmers are already mitigating from these villages to other higher parts of the Nam Hai River plain. Thus, there have been substantial changes in these villages and this has implications to the socio-economic impacts of the project (Norplan, 1996).

Discharging waters from the powerhouse create the following potential effects on livelihood of the farmers living along the Nam Hai River and Nam Hinboun River areas:

1. Prolonging of the duration of floods and higher peak flood levels causing inundation and more sediment deposits in the paddy fields

2. Improved potable water availability and quality along Nam Hai during the dry season.

3. Increased water availability for vegetable gardens and potential irrigation schemes.

4. Improvement of navigation by boat, but reduced accessibility across the tailrace canal and Nam Hai River by foot.

5. Socio disruption at camp site due to conflicts and misunderstanding between the construction workers and the surrounding community.

6. The project has enhanced the establishment of small market sites, leading to increased cash income potential but with the danger of over-exploitation of forest products and fish (Norplan, 1996).

Before THPP dam operation, the Nam Hai River was a small intermittent river that dried up (no water flow) during the dry seasons of most years (February to May). The fishery was based on these flow conditions and fish in the Nam Hai river were caught mostly during the period August-September. Fish along Nam Hinboun river, however, are available throughout the year, although the peak catch again is in September, especially at Ban Vangdao and Ban Keng Khot. Many villages are located along Nam Hai river and Nam Hinboun river use the rivers for washing and bathing and utilize riverbanks for vegetable gardens. They have their livelihood systems set as follows: wet season paddy rice, dry season gardening on riverbanks, livestock rearing, fishing and collection of forest products. Rice is the main staple and fish has historically been the most important source of protein for all villagers.

One year after THPP operation, the team Socio-economic and Environmental Survey from National University of Laos has been study the Socio-economic Dimensions of the communities in the Theun-Hinboun Power Station Impacted Areas (The Nam Hai and Nam Hinboun Rivers Area, the Nam Kading river and Nam Hinboun River to Mekong Area and the Nam Theun River to Elevation 400 meters Area), obtained by surveys during March 5 till March 18,1999, under financial support of THPC (NOUL, 1999). The study found the main constraint of

the village along Nam Hai river and Nam Hinboun river is the unclear water that cause by erosion affected, high spread water current drained by powerhouse, drinking water shortage, poor access road, far from health care center and hospital, no electricity and irrigation system.

After operation commenced, a wide range of impacts were reported from the project's operation, some of which have led to adverse international criticism. Accordingly, THPC engaged a consulting firm to investigate such impacts, and thereafter THPC adopted a ten year Mitigation and Compensation Plan (MCP) in 2000. The MCP identified the major impacts from the project for downstream recipient river villages as follows: (i) loss of dry season riverbank gardens, which are important sources of food and income for the villagers; (ii) loss of access to traditional fishing and fish breeding areas, which are the most important protein source for villagers; (iii) erosion along sections of the Nam Hai river and Nam Hinboun river, which caused loss of land and access to clean water supplies; and (iv) loss of income by villagers due to delays by the company to take action to solve the problems caused by the project (RMR, 2000).

In order to respond to these negative impacts, THPC, established in 2001 an Environmental Management Division (EMD) within the company to address the issues raised in the MCP, which estimated that approximately 3,000 families in 57 villages had been negatively impacted by the project. One of the first actions of the MCP was the development of an Environmental Management and Monitoring Plan (EMP) including a management strategy in the form of a logical framework (Log frame) to implement mitigation activities proposed to offset project impacts. The goals of the EMP included: (i) improve communities' livelihood, (ii) limit physical impact, (iii) reduce external impacts, (iv) develop an efficient administrative management and monitor impacts, and (v) implement a socio-economic and environmental impacts mitigation and compensation plan (EMD, 2001). Furthermore, the Environmental Mitigation and Monitoring Plan (EMP) activities include construction site re-vegetation, water quality monitoring program, measuring erosion rate along the Nam Hai, fisheries monitoring and management, fish conservation education, and village rules and fishermen-to-fishermen training. The Social Impact Compensation Strategy is well conceived and the implementation of activities is largely successful. Two primary strategies have been used for affected communities. Lowland villages along the recipient Nam Hai and Hinboun Rivers were support for livestock rearing and intensive irrigation for dry season rice cultivation, fruit tree and vegetable plots on river levees, as

the chief compensatory measures for loss of livelihoods from declines in fisheries and riverbank garden production. Most of these activities resembled those of a conventional donor–funded integrated rural development project, and there was plenty of evidence to suggest that they were successfully meeting many local needs (Blake, Carson & Tubtim, 2005).

In September 2004, the Evaluation of Environmental and Social Impacts of THPP on Aquatic Life and Fisheries has been prepared by Roel Schouten, Vilaphorn Visounnarath, Bounmy Souvannalath and Keophilavanh Volakummane. This research study covered 145 fishermen at 28 villages along Nam Theun/Nam Kading and along the Nam Hai/Nam Hinboun. Data were obtained by having each fisherman fill in a standard form regarding his daily fish catch over a period of one year. During interviews, fishermen all provided also important information about their past and present fishing practices. The results of this research are summarized below:

1. Fishermen have stated that their annual household fish catch have declined over the last few years due to population growth resulting in more fishing households that share the same aquatic resources.

2. The fish decline was also the result of background impacts on fish populations caused by:

   a. Deforestation, erosion, and sedimentation that modify aquatic habitats;

   b. In the case of Nam Hinboun, discharges from tin mines in Nam Theuk and Nam Pathaen from significant background impacts on fish populations;

   c. Destructive fisheries, such as fishing with explosives;

   d. Large scale fisheries, such as blocking off streams with nets; and

   e. Increased access to markets

3. Combination of impacts by changes in fishing efforts, changes in background water quality, and changes by the project has resulted in impacts on annual village fish yields. The changes in annual village yields differ per location. As the downstream of the powerhouse in Nam Hai and Nam Hinboun up till the Mekong River: annual village fish yield declined significantly after the project. Overall, the project has resulted in decline of average household fish catch per village from 5% to 80% depending on the location of the village. However, there are other impacts on annual village fish yields than from the project alone such as natural

draughts and floods, population, and changed fishing efforts of households as a result of increased fish trade opportunities.

2.6.2 Theun Hinboun Expansion Project Description

Since 2004, THPC has proposed a new scheme to enlarge the hydropower potential of the project and provide more water inflow into the power plant's head pond. This scheme, know as the Theun Hinboun Expansion Project (THXP), involves construction of an upstream dam and reservoir on the Nam Gnouang (NG8 dam site) and expansion of the generating capacity of the Theun Hinboun power station with an additional 210 MW. The expansion project is designed to release more water (220 m3/s) downstream in the Nam Hai river and thus into the Nam Hinboun river. The construction period for this expansion project is scheduled for 2008-2011 (Norplan, 2007). THPC has prepared EIA, EMMP and RAP studies to address the environmental and socio-economic issues arising from the cumulative impacts of THPP and THXP (Norplan, 2007).

The EIA report was prepared by team of experts from NORPLAN A.S of Norway (Norplan, 2007). The report is largely based on previous reports and documentation. The primary source of information for EIA preparation has been the Social Action and Environmental Management Plans produced by the consulting company Resource and Management Research (RMR). In addition information has been gathered from THXP impact zone. Information from SWECO Feasibility and Hydrology Studies (Norplan, 2007) The Lao office of Wildlife Conservation Society (WCS) has provided an assessment of the biodiversity situation in the catchment and proposed a Biodiversity Development and Protection Plan (Norplan, 2007, p. 24) EIA Process)

The approach used for EIA study and structure of the report follows standard EIA guidelines which are also prescribed in government of Lao PDR regulation. The report divided in the main impact assessment and Environment Management and Monitoring Plan (EMMP).

The potential project impacts on the Nam Hai and Nam Hinboun rivers (zone 3a recipient rivers) are outlined as follows:

Physical impact

Hydrology: Several significant hydrological changes will determine the impacts: the intermittent flow pattern in Nam Hai and Nam Hinboun rivers will continue but with a doubling

of the maximum flow release. These hydrology changes will have significant consequences for water quality, for aquatic life, fish biology and for human use for the river and riparian area.

1. Water quality: downstream in Nam Hai river, re-oxygenation processes in the tailrace and the aeration weir of the regulating pond are expected to result in discharge of water with acceptable oxygen availability. The erosion and sediment transport processes in Nam Hai and Nam Hinboun rivers will continue. The total volume of transport sediments will increase significantly but the level of solid per liter of water will be similar to the current situation.

2. River Morphology: The ongoing process of river bank erosion and river bed sediment transport in Nam Hai and Nam Hinboun rivers will increase with the new intermittent flow regime. The shape and geomorphology of the river reach between the regulating weir and the Mekong will change.

3. Flooding: in the Nam Hai downstream of Ban Nasanam, the frequency of floods will change. The peak magnitude of a natural 100 years flood previously, under the current THPC scheme occur on average every 20 year. The THXP releases will cause this magnitude every 2-5 years.

In Nam Hinboun , upstream of the limestone gorge, the changes in frequency of flood magnitudes will be less pronounced. The peak magnitude of a natural 100 years flood today occurs, on average, every 80 years. With the expansion project, the level will happen every 60 years. The annually flooded area in the Nam Hai and upper part of Nam Hinboun rivers are presently on average 23 km^2. This will increase to 38 km^2 with the THXP releases; the duration of the flooding will increase accordingly.

4. Aquatic Life and Fish: in the reaches of Nam Hai and Nam Hinboun rivers already impacted by the intermittent water releases from the existing THPP, the aquatic ecosystem has been dramatically changes and biodiversity seriously degraded. This situation will continue and in some respects increase as a result of THXP releases.

Social impact for recipient river villages

The main social impacts for the recipient river villages will be potential loss of houses and structures, impacts on agricultural land, impacts on fishing, health as listed below:

1. Loss of houses and structures

2. Impacts on agriculture land: increased flow in recipient rivers will increase water level, and also increase duration and frequency of flooding. This will affect pumping station and riverbank gardens along the rivers. For some households this will lead to permanent loss of agricultural land and might for some households lead to relocation of resident.

3. Impacts on fishing: increased fluctuation flow in the rivers will make it difficult to use traditional fishing techniques, which will affect fish catch.

4. Health impacts: poor water quality for drinking supplies and health risk from increased frequency and duration of flooding such as water pollution.

The additional waters to be diverted from THXP will cause several significant hydrological changes. The hydrological changes will have further consequences for water quality, for aquatic life and fish biology and for human use of the river along riparian areas. The peak duration of the natural 100 years flood is today every 5 years and with the expansion project that duration will occur several times per year on average (SWECO, 2007).

The result of greater flooding frequency and duration has prompted THXP to mitigate the impacts by moving (relocating) impacted households to higher elevation ground, that is to a new "safe level" location. The "safe level" was selected based on (what was considered as) an acceptable flooding condition for the villages of "flooding frequency of once every 10 years at a depth of no more than 20 cms and for a duration of no more than a few days" (Norplan, 2007).
The first goal for the relocation action plan for the recipient area will be to move 19 villages to six new places and relocation will start in 2009 (RAP presentation, 2008).

THPC has reorganized its present structure to establish a new Social and Environmental Division (SED), which will replace the existing EMD. It will be managed from the project site (THXP) by the SED Manager and comprise an Environmental Unit (EU), a Resettlement Unit, a Social Development Unit and a Downstream Unit. The SED is responsible for all social and environmental activities and is working in close cooperation with Government of Lao (GoL) organizations and agencies. THXP has the primary responsibility to carry out resettlement and livelihood restoration and improvement, and GoL agencies will be partners, continuing to provide support for all implementation and monitoring teams in the field (Norplan, 2008).

2.6.2.1 THXP Policy framework

Objective of the Resettlement Policy

Outline basic principles for resettlement and compensation for Project Affected Persons (PAPs) for the upgrading and establishment of sustainable livelihood systems:

1. Ensure PAPs, both resettlement and host villagers, participate in consultations, planning and preparation of the resettlement process

2. Ensure that special measure are provided to ethnic minorities and vulnerable group that foster self-reliance

3. Resettled populations improve their standards of living and that incomes are above the Rural National Poverty Line within five years after relocation

4. Provide for the construction of infrastructure in resettlement areas and host villages in the best interests of the PAPs and in cooperation with Khamkeut District authorities

5. Provide replacement land to all those interested Resettlers, with cash compensation only being considered for those who have specific plans to relocation outside Khamkeut District

6. Resettlement and rehabilitation plans will be conceived and executed as development plans

Compensation Policy

1. Compensation for livelihoods is based on the principle of restoration and development costs of livelihoods and production systems for losses of a value greater than 25% of land and/or production.

2. Compensation is based on the principle of replacement cost for the loss of production, land and structures of a value less than 20% of the local and/or production based on of the local market value prevailing at the time.

3. Compensation is based on the principle of replacement cost for the loss of immoveable assets, including fruit trees and crops, and permanent structures.

4. The project will provide housing and agricultural land to each households in the reservoir area at the time of the population and assets survey.

5. Structures owned by the state or communally by villagers, such as schools, dispensaries, markets, temples, community halls, cemeteries, roads and other structures, will either compensated for at replacement cost or host village structures will be improved and upgraded in relation to the population increase of resettlers.

6. The company will provide for the transportation of building materials, goods, livestock and personal belongings from old houses to the new sites. The company will also compensate for the labour and equipment required during transportation to the new sites.

7. Replacement houses will be provided to all resettling households with a house area of 70 m2 for households of seven persons or more and a housing area of 60 m2 for households with six members or less. Households with seven or more members will have the option of splitting into two houses. Households will be given the opportunity of providing paid labor in the construction of new houses and consulting on design details.

8. For households not wishing to receive any such land or housing, the Project will pay cash compensation at replacement cost (single payment) for all land, structures and assets based on the local market value prevailing at the time. The company will also pay for transportation to a destination. Cash payment will be given to the resettlement proposal by the Resettlement Management Unit.

9. Food security will be provided to households until the National Rural Income Targets have been met.

10. All Project Affected Persons will be entitled to fair and prompt compensation or replacement of assets lost.

11. Households in the Reservoir Area as of 1 March 2007 that have been registered will be entitled to compensation, including natural growth of these households.

2.6.2.2 Entitlements for Relocation Village

The THXP will subsidy labour cost for dismantling of houses, barns, livestock pens, other building and fences, and cost for transporting materials to new sides, labour cost for re-assembling houses and structures at new relocation, Technical assistance during relocation, Replacement cost of any materials or assets that are cannot be moved or damaged during salvage including fasteners, delivery of prefabricated concrete posts and corrugated iron roofing for all

relocated houses if the relocation Household desires, Electricity connection to the relocated residence with private meter, Relocation and reestablishment of community structures such as temples and schools in better condition than the original buildings, All season vehicular access to village relocation sides, Clean and year-round sufficient domestic communal water supply, Training and support for village livelihood improvement, Saving and credit group for men and women, All PAPs to have access to Grievance Committee for complaints. The target income is 14,200,000 kip (approximately 1,670 US) per household per year (Norplan, 2007).

Livelihood improvement packages are designed to be accessible to PAPs of all socio-economic status. Each package will come with options for high and low input levels to cater for families with labour deficiencies and/or who are risk adverse. Extension methods ensure informed choices and use gender-sensitive methodologies. Livelihood improvement packages will be phased in through a 3 stage, approaches to allow PAPs to test if they find selected activities suitable before the commitment (Norplan, 2007)

The village' incomes and livelihood improvement programs are diverse and options available are constrained by the geographical, hydrological and demographical condition with will occur in the area after the Project impacts are realized. The follow options will be with an additional will be included as implementation progresses (Norplan, 2007):

1. Forage Production and improved ruminant husbandry
2. Pig feed production and improved raising
3. Poultry production for consumption and sale
4. Fish and frog raising in ponds
5. Cash crop production
6. Cottage industry development
7. Mixed Orchard/Plantations
8. Rice production (Norplan, 2007)

2.6.2.3 THXP Monitoring Baseline 2008.

SED completed baseline survey for the THXP Area for 2008. In total, there were 1489 respondents to the general households survey conducted in August-September 2008 for this first THXP Annual Monitoring Report. These result are presented against the Project

Targets, both Income Targets (2008 levels) and core Human Development Indicators relating to health, education, services and quality of life. The results of THXP is present below:

There are twelve villages (Khounkham, Namsanam, Nakham, Thakhong, Tha, Done, Vangdao, Nasakong, Kengkhot and Khen), located along Nam Hai, at the confluent of the Nam Hai and Nam Hinboun and below the confluence until the end of the gorge, but only 4 village (28%) have access to clean water and 55% use latrines, less than half households having sufficient rice with is impacted from THPP operation, high rainfall some years causing more extensive flooding and crop damage, poor paddy rice crop husbandry because farmers do not want to invest cash or labor due to high risk of flooding. Generally, fisheries in THPP areas are degraded due to over-fishing, THPP impacts and use of unsustainable fishing methods.

2.7 Project objectors

The THPP was approved despite concerns raised by Norway, groups in Thailand and other ADB-donor countries. Primarily, the concern was that the project proponents had failed to safeguard the interests of Lao citizens. Issues and concerns include: Poor decision making process, inadequate environmental impact assessment, conflicts of interest potential for severe environmental and socio-economic impacts. These issues and concerns have been consistently downplayed or ignored by ADB and the project developers. The ADB and other proponents downplayed or ignored by ADB and the project developers. The ADB and other proponents downplayed the environmental and social impacts raised by environmental groups. At the time of its official opening in April 1998, ADB praised Theun-Hiboun as a “model project” with “little for the environmental lobby to criticize.” (IRN,1999).

Below are some of the concerns raised by non-government organizations and civil society organizations in relations to the THPP:

The THPP is just one of many controversial projects in Laos. The same problems are revealed on other similar hydropower projects. The impacts of this project are astonishing. Approximately 6000 people who live in 25 villages near the project site are considered being so vulnerable to the effects of this project that they were forced to resettle to other places.

Resettlements resulted in changes in social context, lifestyle and agricultural practices. Resettled groups are reported to suffered especially from declining of nutritional intake, rising sickness and mortality rates, loss of language and cultural" (Community Aid Abroad – Oxfam Australia, 1998). The villagers on downstream rivers are begun suffering increasingly severe impacts to their livelihoods from the project. These impacts have included the loss of fisheries, flooded vegetable gardens, loss of drinking water supply, lowered water tables, impaired boat and pedestrian access to surrounding areas, inundation of agricultural lands, bank erosion, and the loss of fishing equipment. This has created great hardships for thousands of local people-reducing their food security, cash income, and overall quality of life. Those affected by the project were receiving no direct compensation for their losses and there were no plans to provide them with any such compensation in the future. In some areas, villagers were forced t relocate, but did not feel they were receiving adequate assistance with this process more of relocation than a resettlement (Shoemaker, 1998). The conditions of people who relocated in effected areas were far worse than what ADB and other proponents claimed. Other independent visitors followed suit and confirmed the impacts. ADB and THPC initially refused to acknowledge the occurrence of these impacts, and attempted to discredit the accounts. There was even a point where an ADB mission was launched to track down and make the informants retract their statements (IRN, 1998). The project is in clear violation of the ADB lending guidelines which start those local citizens should be left no worse off by their projects. The project diverts water from the Theun to the Hai and Hinboun River, causing serious erosion and flooding in these river basins. Many villagers living along the Hai and Hinboun Rivers have abandoned wet-season rice fields because the floods have made rice cultivation unviable. The flooding has also caused water contamination, livestock deaths and other hardships for villagers living downstream. Alarmingly, water fluctuations have reportedly resulted in the death of several people. But THPC's mitigation and compensation program started too late and has done too little to address these impacts, ignoring the recommendations of a review the company itself commissioned (Lawrence, 2008). The Mitigation and Compensation Plan provides no evidence that the initiatives proposed were developed together with local communities as their preferred options for compensation. As of July 2000, villagers in the area had very little idea of what measures were being proposed for compensation. Local people do not appear to have had sufficient opportunity to give input into proposed mitigation and compensation measures or to

formally approve of the MCP plan (Shoemaker, 2000). The MCP program did not identify aggravated wet season flooding as a critical issue, likely because flooding problems on the recipient Hinboun River had not yet become serious. Many villages in the middle and lower Hinboun valley have not yet received electricity services, nearly ten years after the THPC project came online. THPC not respond by their Concession Agreement with the Government of Laos to provide electricity to all villages along the Hinboun River (Barney, 2007).

The mitigation and Compensation Program initiated by THPC in 2001 to address the project's social and environmental impacts has not lived up to expectations and its failing to restore people's livelihoods. Many concern raised in the Independent Review of the Environmental Management Division conducted in March 2004 have either been ignored or adequately dealt with. The proposed Expansion Project poses numerous serious risks to the livelihoods and well-being the downstream communities, which are already suffering uncompensated losses caused by the existing THPP (FIVAS, 2007).

The RAP fails to quantify the damages that will be sustained from the significant loss of common property resources and to determined acceptable levels of compensation based on those losses. Instead the RAP proposes replacing losses with livelihood restoration programs. The problem with this approach is that the proposed measures have already been tried with limited success at the existing Theun-Hinboun Hydropower Project. The RAP fails to draw lessons from the successes and failures of the mitigation and compensation program at the existing project, or from the experiences at the Nam Theun 2 Hydropower Project, which is currently under construction upstream. As such, THXP is poised to repeat past mistakes. Ten years after the Theun-Hinboun project began operating, communities are worse off than they were before project development (Aviva Imhof, April 2008). "In the resettlement areas, both host villagers and resettlement communities will be forced to compete for increasingly scarce land and natural resources, which will inevitably lower living standards for all involved." (IR & FIVAS, 2008).

CHAPTER 3

RESEARCH METHODOLOGIES

The research of socio-economic impacts of Theun-Hinboun Power Project (THPP) in recipient river communities, Lao PDR, identifies the scope of study, population size, data collection, research material, sampling, data analysis, statistic use and duration of the research study.

3.1 Study Site

The target sample groups of the socio-economic study consist of four villages (Nasakong village, Phakonko village, Kengkhot village and Khen village) in recipient river community located in Hinboun District, Khammouane Province. There are two villages located along Nam Ahoy River the tributary of Nam Hinboun River and two villages located along Nam Hinboun River (below the confluence Nam Hai River with Nam Hinboun River). These villages will be combined in the Phou Makneng relocation area in the dry season of 2009. The combined population of these villages is 153 households and 964 inhabitants.

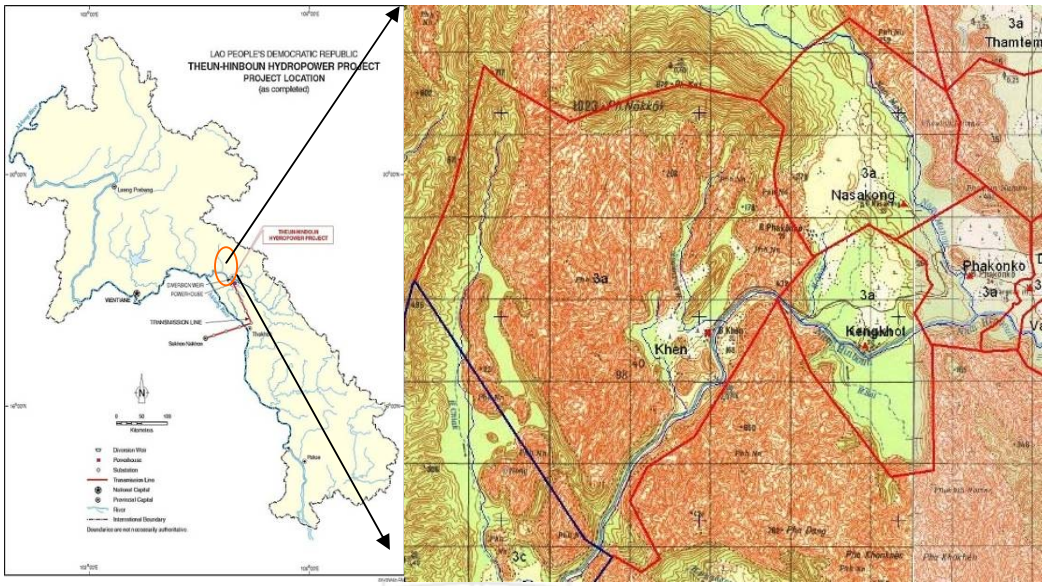


Figure 3.1 The study area in the Hinboun District, Khammouan Province, Lao PDR

The two villages located along Nam Ahoy River the tributary of Nam Hinboun River are:

3.1.1 Nasakong Village

Before Laos became independent, the village was located at the same site of Kengkot Village and used to be called Nang Sakong (Nang mean miss). The villagers have moved to settle down to the current village and changed the name to Nasakong for more than 30 years.

The village locates on a flat land along Nam Ahoy River which is a small river as a tributary of Nam Hiboun River. Nam Ahoy River acts as a main fishing and aquatic sources, and villagers also use this water for agriculture, bathing and laundry.

The village is comprised of 26 households with its inhabitants of 150 who 72 are females. Nine households were selected for interview. The access road is about 5 km from village to Route No.8, which the villagers can use to travel to the town and trading center with by both public and private transportation. The condition of access road turns poor during rainy season.

Figure 3.2 Nasakong Village

3.1.2 Phakolko Village

The village has been settled for more than hundred years along Nam Ahoy River and surrounded by mountain and steep rock. Since 2002, the village comprised of two hamlets: ancestral (26 households) and new hamlet (11 households). The new hamlet located in foot hill 1 km from ancestral village. They moved here to avoid flooding. The two hamlets are 243 inhabitants, of these 132 are female. Fourteen households were selected for interview. The village shares the border with Nasakong village in the north, the western part border with Dorn Village, and the southern part border with Kengkot village.

Figure 3.3 Phakonko village (new hamlet)

The two villages located along Nam Hinboun River.

3.1.3 Kengkhot Village

The village is located in the area about 5 ha along Hinboun River and comprised of 42 households and its inhabitants of 250, of these 132 are females. Seventeen households were selected for interview. In the north of village bordered with Vang Dao village, the north east bordered with Phakolko village and the southern part bordered with Khen village. The village lacks of feeding road, only tracts and motorcycle are available and can be used only during the dry season. Nam Hinboun is alternative way for traveling by boat and canoe.

The village is covered with fruit trees such as Mangos, coconuts, tamarinds and other kind of local fruit trees.

Figure 3.4 Kengkhot village

3.1.4 Khen Village

The village is located in a residential area of 16 ha and within the boundary of the village is the moderate and flat land. Khen village is located along Nam Hinboun River between Kengkhot village in the north and Tonglom village in the south, which is composed of 48 households with its inhabitants of 258, of these 126 are females. Twenty households were selected for interview. The access road is in very poor conditions even in dry season. They, therefore, initially travel by boat to the neighboring villages in order to get to main road.

Figure 3.5 Khen Village

All of four villages lack of infrastructure such as electricity, health care accessibility, and poor access road even in dry season.

Every village has only primary school with insufficient teaching and learning materials and lacks of teachers for all levels as bellow:

Table 3.1 The number of students, teachers, class room and grades in primary schools in four vilage

Village	Class room	Grade	No of student	No of teacher
Nasakong	3	3	23	1
Phakonko	3	3	36	1
Kengkhot	3	5	53	3
Khen	3	5	37	1
Total	**12**	**16**	**149**	**6**

The village headman reported that they could not improve any facilities because they have to relocate. In case of Khen Village in the year 2008-2009, students for level one are not accepted to be enrolled because of relocation.

For secondary level, they have to study in Napouk Secondary School and Nahin Secondary School. Therefore a few students can continue their education especially in secondary level. The reasons are that secondary school is far from their villages; the parents with low income and could not support their children after completing primary school or event after level three.

The villagers have agriculture land, average 1-2 ha per household. Almost all households practice rainy paddy fields for rice production purpose, growing cash crop and seasonal vegetables such as cassava, yam bean, eggplant, corn, long bean, chili, melon, pumpkin, gourds and so on. A few families grow tobacco to generate income but high cost of investment. Even worse, the agricultural products are low as well as the price.

The forests surrounding village are as the main sources for daily food such as bamboo shoots, mushroom, wildlife (rats, squirrels) and other kinds of protein and vegetable, especially in wet season. For dry season, villagers can get many kinds of vegetables from their gardens. The rivers and streams are the main source for fish and aquatic food, but in dry season it is difficult to find as many source of food as the wet season or even worse the food source is not enough with demand there are different reasons in different villages. Therefore they eat other protein from streams and paddy fields such as frog, shell and crab.

Both of these natural resources were considered in this study as the main important sources for local livelihood and even income. Data collected on natural resource use included: the frequency of collection, the time and distance of collection and the percentage of trading.

3.2 Households Survey Method

The surveys are the preferred method if the researcher wishes to obtain a small amount of information from a large number of subjects. The questionnaires should be tested through administration to small groups to determine their usefulness and reliability. 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 possibly provide accuracy, generality, 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 assumes that every household has an equal and independent chance of being chosen for survey. In theory, this simple random sampling 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

Data collection was carried out with the cooperation of the Social & Environmental Division (SED) management of THXP and the Administration Office of Hinboun District, Khammuan Province, GoL.

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

3.3.1 Primary data

Primary data collected from:

3.3.1.1 Field observation

3.3.1.2 Field survey (interview sample group)

3.3.1.3 Group discussion

3.3.1.1 Field Observations

Before field survey started the researcher went to visited and observed many villages in THPP areas included these four villages during May, 2008 with SED employee especially People Involvement (PI) team. The result of this field visit and observation provided researcher with better understanding of the SED field work and these villages situation.

3.3.1.2 Field Survey

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

The sample size for this research was 60 households, according to the Yamane Table 2 (Taro Yamane, 1970) Sample size for ±10% Precision Levels where Confidence Level is 95% and P=.5.). ±10% Precision Levels were chosen because the economic levels in the study area are similar.

The questionnaire was designed four target villages and focusing on attitudes relating to impacts from THPP and comprised four parts: (1) general household information, (2) impacts from THPP including positive impacts (job, income, facilities) and negative impacts (loss properties, land use, job, income, agricultural products, protein resources), (3) the attitude of the villagers towards relocation.

The data were collected from field survey by using questionnaires with the sampling population for both quantitative and qualitative methods. The first household survey was carried out during 21 – 24 October 2008. The second survey was carried during 5 – 8 January 2009. 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. The survey was conducted in Lao language without translation, because all villagers are Lao-Thai minority group 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 respond all questions asked during the interview.

3.3.1.3 Group discussions

Every village after household-by-household interviews, held a meeting with all villagers participating (both persons interviewed and not interviewed) to discuss and tell about their problems. The results of discussion were carefully noted.

3.3.2 Secondary data collection

Secondary data were collected from WREA (Water Resources and Environment Administration) and SED (Social and Environmental Division) of THXP (see Table 3.2)

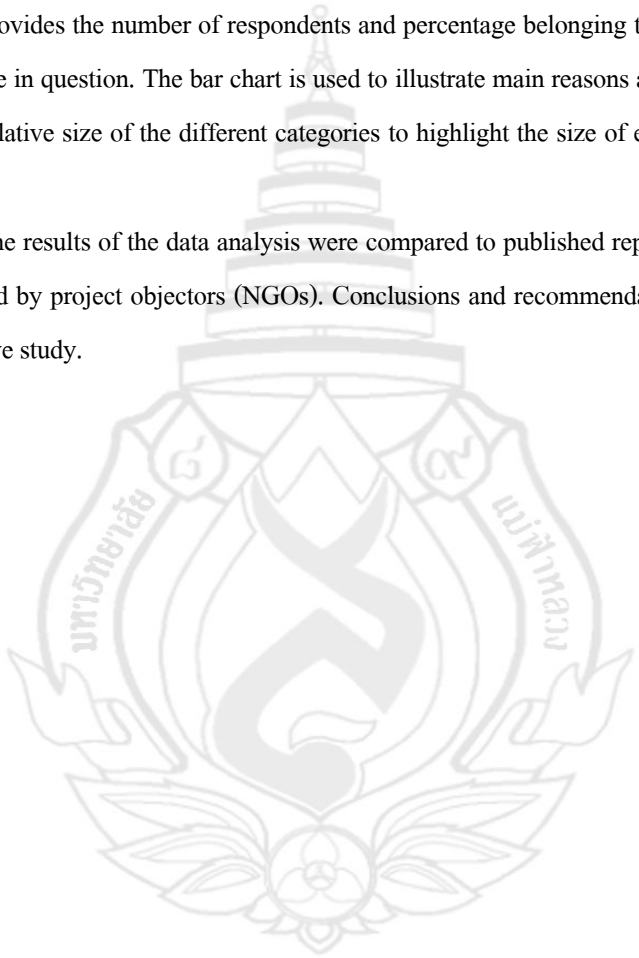
Table3.2: Sources and type of secondary data collection

No	Source of data	Secondary data collected
1	WREA (Water Resources and Environment Administration).	1. Regulation for implementing Decree on Compensation and Resettlement of People Affected by Development Project 2. Regulation on environment Assessment in the Lao PDR 3. Draft final Resettlement Action Plan 4. Draft Final Amended Initial Environmental Examination of the TXHP 5. Land Capability Assessment and Land Use Planning for Potential Resettlement Sites
2	Social and Environmental Division (SED)	1. THPP EIA, MCP 2. THXP EIA,EMMP, RAP 3. Review of the Environmental Management Division 4. SED Monitoring baseline report 2008 5. THPC research and reports 6. Mitigation and Compensation Plan 7. Phou Mak Neng relocation schedule 8. Fish report 9. Livelihood restoration report
3	Textbook, journal, thesis, reports, etc.	1. Information of dam and hydropower projects 2. NGOs reports of THPP and Relevant research information

3.4 Data Analysis

The field survey data were checked and used Statistical Package for Social Science (SPSS) software package version 13.0 to analyze and interpret. 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 results of the data analysis were compared to published reports by both the project proponents and by project objectors (NGOs). Conclusions and recommendations were drawn from the comparative study.



CHAPTER 4

RESULTS AND DISCUSSION

The analysis of socio-economic impacts of THPP are presented in five sections, namely, (1) General information of HH respondents, (2) The socio-economic impacts of THPP operation, (3) THPC Compensation program, (4) Evaluation of THPP and THXP compensation for recipient river communities, and (5) Attitude of villagers towards the THXP and relocation. All data were analyzed by descriptive statistics and the results are shown in tables, Bar charts and Pie charts listing the number of HH respondents and percentage of total.

4.1 General information of HH respondents

4.1.1 Living Background and age of household respondents

The majority of interviewees (70%) were living in their original birthplaces, and 30% had moved from nearby villages. Most of them moved into the study area to marry (6 HH), 2 HH moved because of good natural resources, and only one HH moved from Phakonko village to Nasakong village to avoid flooding.

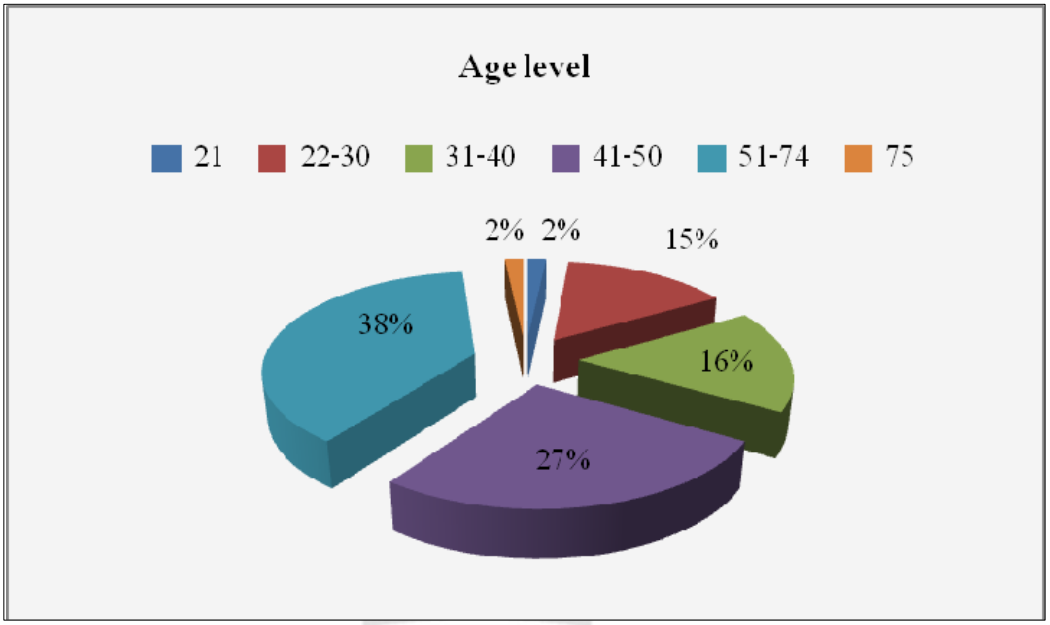


Figure 4.1 Age level of HH respondents

The age interviewed population minimum was 21 years old, and maximum was 75 years old (male). The average age was 54 years old. Most of the interviewees (43.3%) were in the age group of 21 – 40 years old. Among the interviewees, 78.3% were male and 21.7% were female.

4.1.2 Household size and migration

The average household size was 6.72 members (household member ranged from 2 to 14), which was within the standard of typical Lao families. The largest family size 11 to 14 members comprised only 5%, the big family size of 8 to 10 members was 26.7%, the middle family size between 5 to 7 members comprised 53.3%, and the small family size between 2 to 4 members was 15% of the households sampled. The households in Lao PDR are generally large due to Lao culture which places the responsibility for elderly care on the children. Children are expected to take care of their parents, and in some cases their grandparents or other closed relationships.

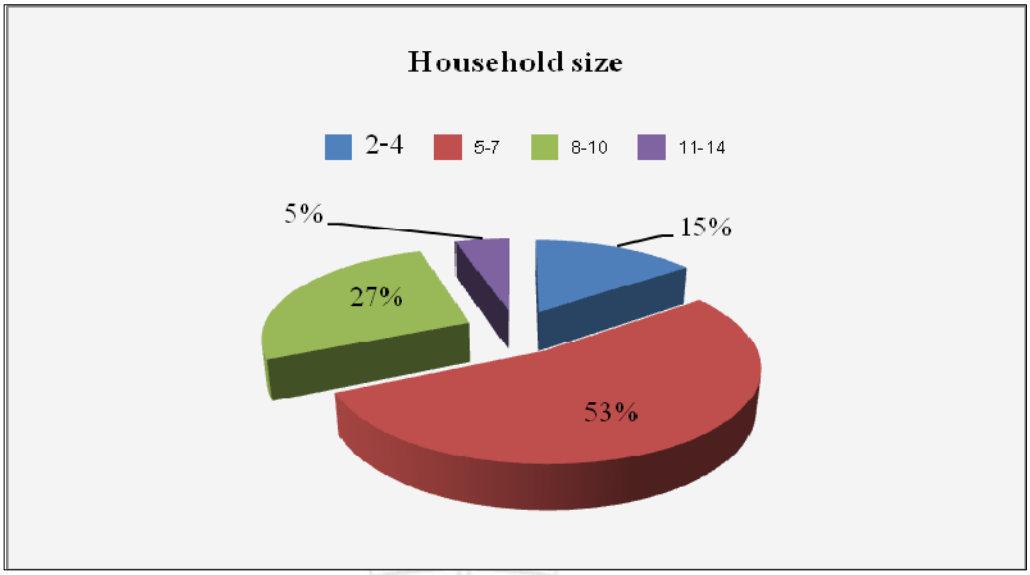


Figure 4.2 Household size of HH respondents

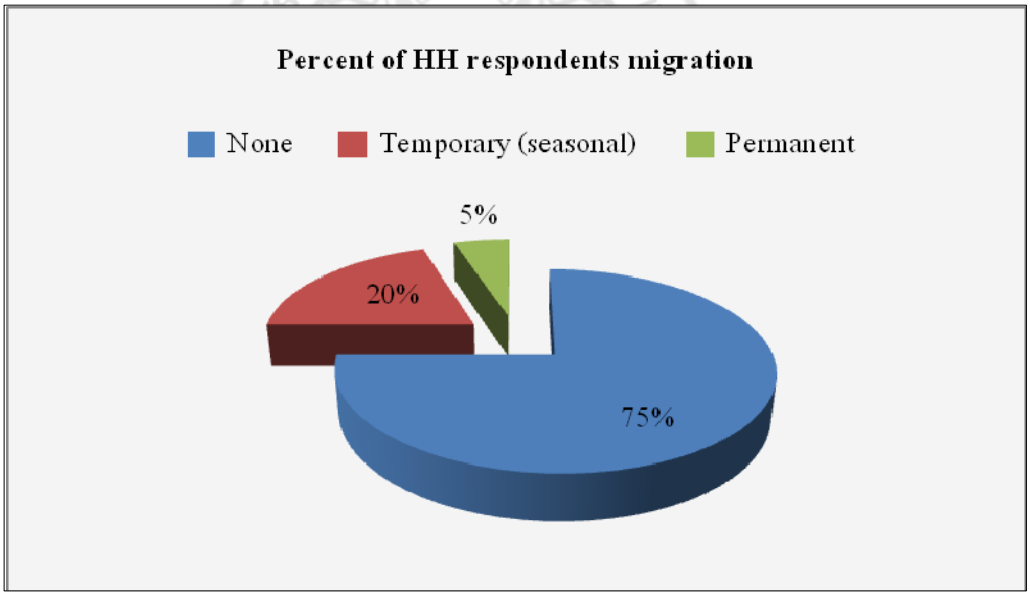


Figure 4.3 Villager migration

Of all the households interviewed, there are 20% who temporarily (seasonally) moved

to big cities, such as Thakhek, Savanh and Vientiane for cash income. These are young people. Most of them work at factories and restaurants. About 1.7% were resettled in other villages because of flooding, 1.7% moved out to marry and 1.7 % for permanent work in Vientiane as a government officer.

4.1.3 Education

The interviewees of four villages were 28.3% illiterate. Most of the interviewees (56.67%) completed primary level education only. This means they are capable of writing and reading because their villages have only a primary school. About 13.3% achieved a lower secondary level and only 1.67% achieved an upper secondary level education.

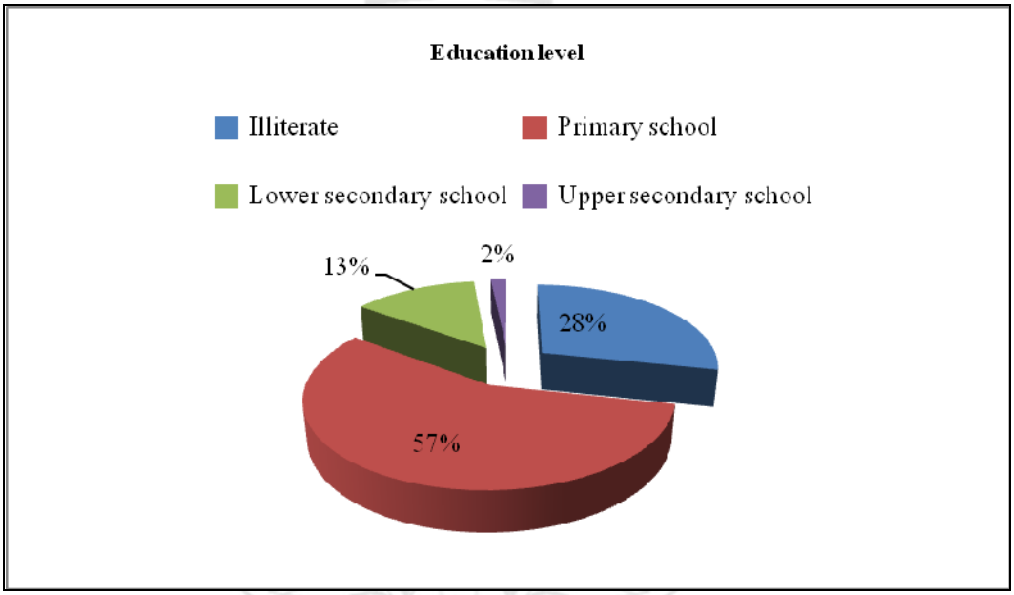


Figure 4.4 Education level of HH respondents

4.1.4 Occupation

Almost of HH respondents have the main occupation as farmers which mean paddy rice field practices, upland rice production, dry season vegetable gardening, and livestock raising. The extra occupations included 11.7% were fisherman, about 26.7% were wage labour, and only 6.7% of HH respondents were sellers. More than 55% had no extra occupation due to the facts that this area has limited job opportunities, is far from the city and the market as shown in Figure 4.5

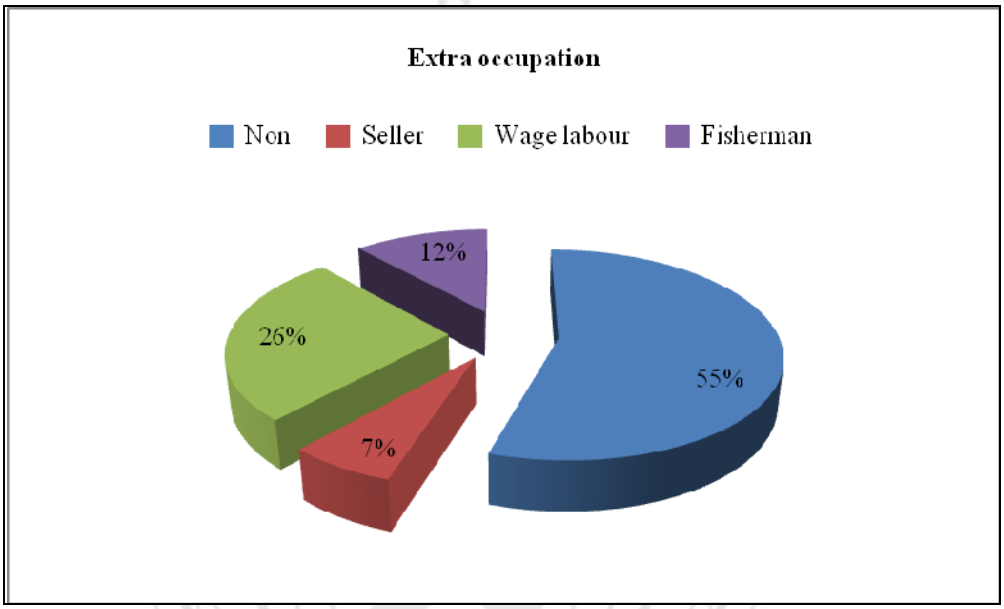


Figure 4.5 Extra occupations of HH respondents

4.1.5 Paddy land ownership and food security

Several questions dealt with the issue of agriculture land. Information was collected and reported on paddy rice field areas, because the size of the paddy area relates to rice production and food security.

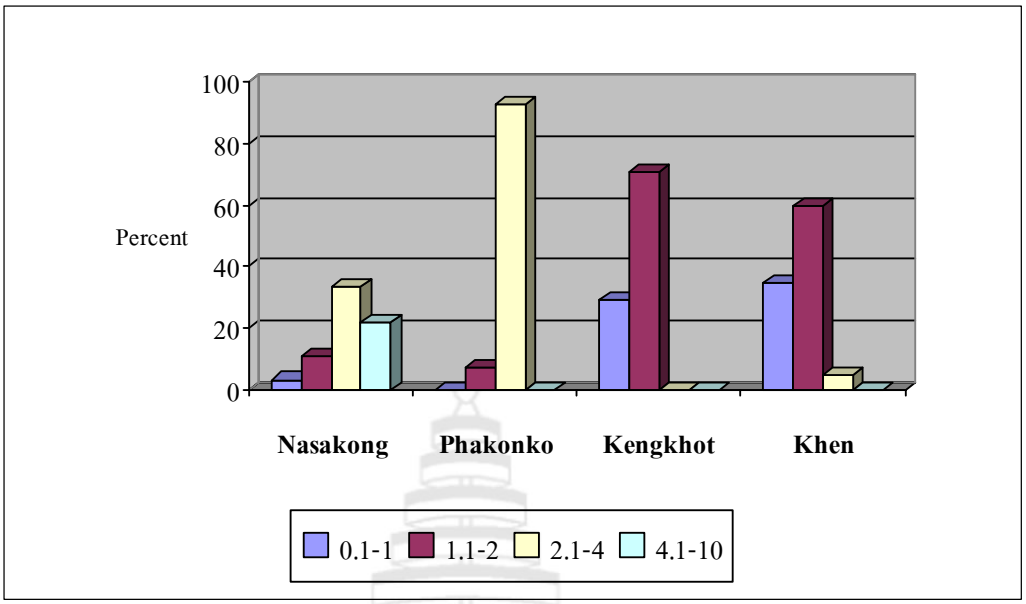


Figure 4.6 Paddy land of HH respondents

The four target villages are located in lowland. They therefore have wide available paddy fields. Not many households practice upland rice with limited areas of production and low yield of products, but they can harvest wet season crops from upland rice fields for daily subsistence. They are all (100%) owning their paddy land with land tax payment receipts for formal land, the lowest level of land ownership documentation.

According to the result of Social and Environmental Division (SED) monitoring in December 2008 or THXP baseline data has presented of the food security for twelve villages along Nam Hai and confluent with Nam Hinboun Area included Nasakong Village, Phakonko Village, Kengkhot Village and Khen Village) had the lowest food security, with less than half household having sufficient rice due to impacted by THPP operation. It is can concluded that the result of this study and the THXP survey are not different, only THXP baseline data reported by zone but this study reported by village.

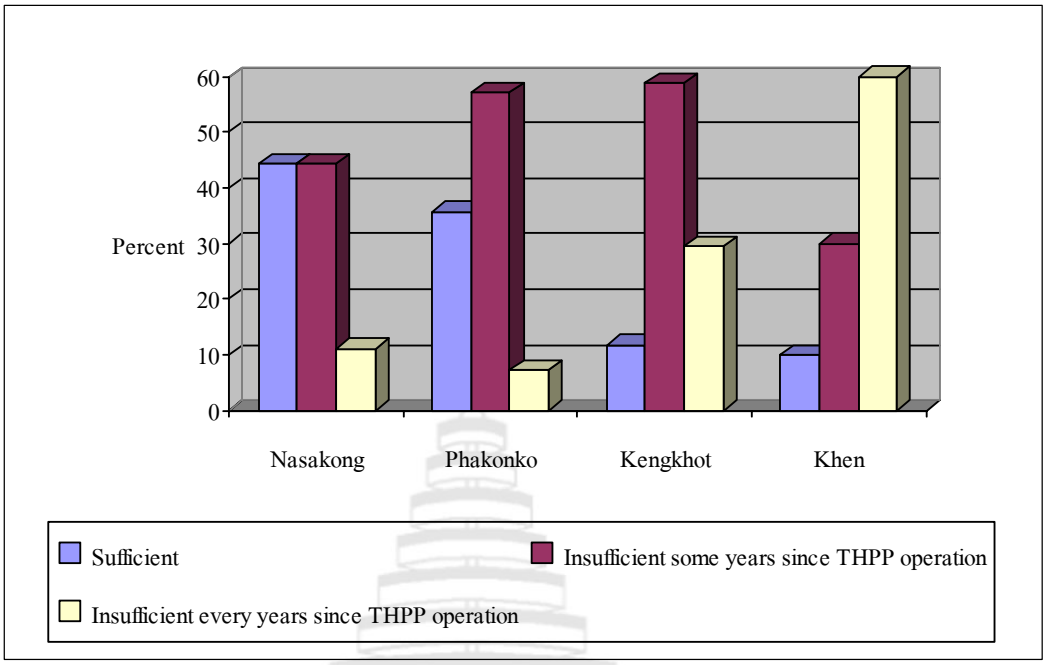


Figure 4.7 Food security in each village

Food security differs considerably among target villages as presented in Figure 4.7 The highest security village is presently the Nasakong village and the second is Phakonko village due to Nasakong being located far from Nam Hai and Nam Hinboun rivers than Kengkhot and Khen village.

The coping mechanism used for rice shortages are: 69% of HH respondents buy rice from the market or sellers, 18% of them buy and sometimes borrow from their relatives, 8% of them get rice from the sellers and they have to return to the sellers after harvest more than they get from. This way of living conditions make that groups of people become poorer and poorer. (see Figure 4.8).

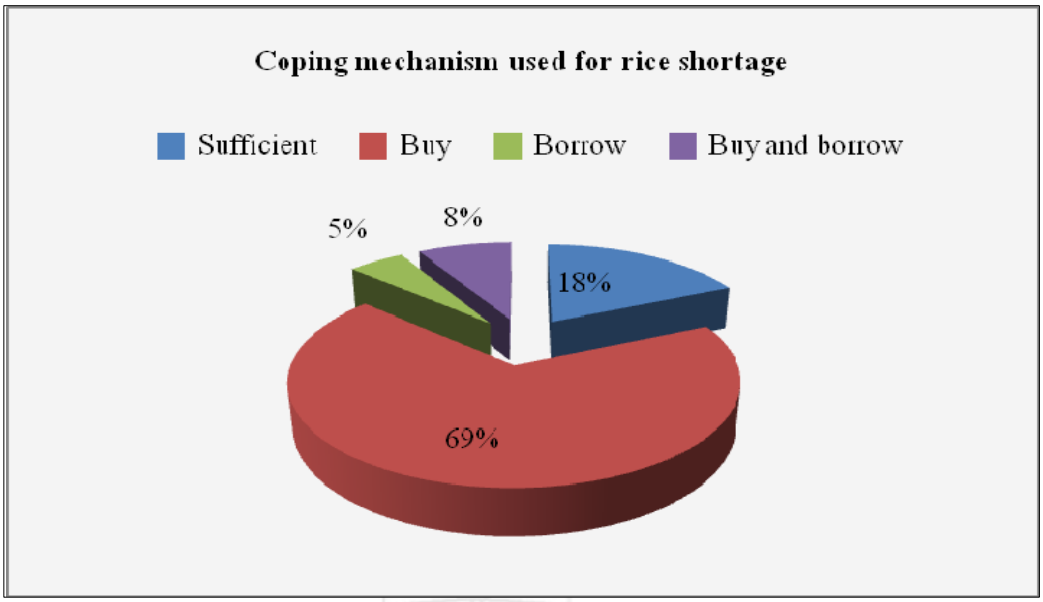


Figure 4.8 Coping mechanism used for rice shortage

People in this area usually consume sticky rice (*Oryza satia* Linn.) as the carbohydrate-based for daily nutrition.

4.1.6 Main income sources and main expenditure

The questionnaire to deal with HH income and expenditure focused on main sources of income rather than amounts of income and expenditures, because of limit time and capacity. Moreover this survey started after the THXP baseline survey finished, and income and expenditure data are available from the THXP baseline survey. Therefore the questionnaire was designed not to repeat the THXP baseline survey questionnaire for avoiding that respondents were bored and uncooperative with answers to the same question.

As a result of THXP baseline survey 2008, the average combined income for Khen villages is 9,390,662 kip (approximately 1,147 US), Kengkhot villagers 11,367,075 kip (approximately 1,337 US), Nasakong villagers is 19,552,202 kip (proximately 2,300 US), Phakonko villagers is 28,900,029 kip (approximately 3,400 US). Phakonko Villagers stand out with high incomes for this area, mostly due to successful rice and tobacco crops in the survey period.

The THXP baseline data study shows combined income by HH from livelihood packages, fish catch, crop production, livestock raising and from cash income. There are differences between the four villages which depend on location and marketability of the products.

The overall income from research findings and the THXP baseline finding are not different as income from livestock raising is the highest and lower from crop production, especially in Khen village and Kengkhot villages (see Figure 4.9).

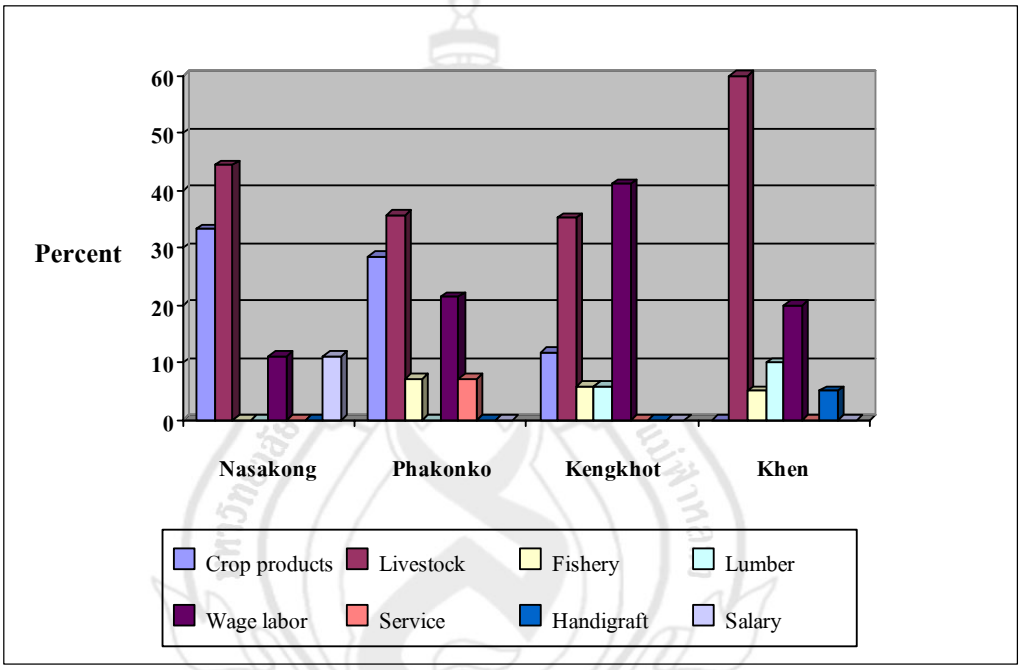


Figure 4.9 Income sources

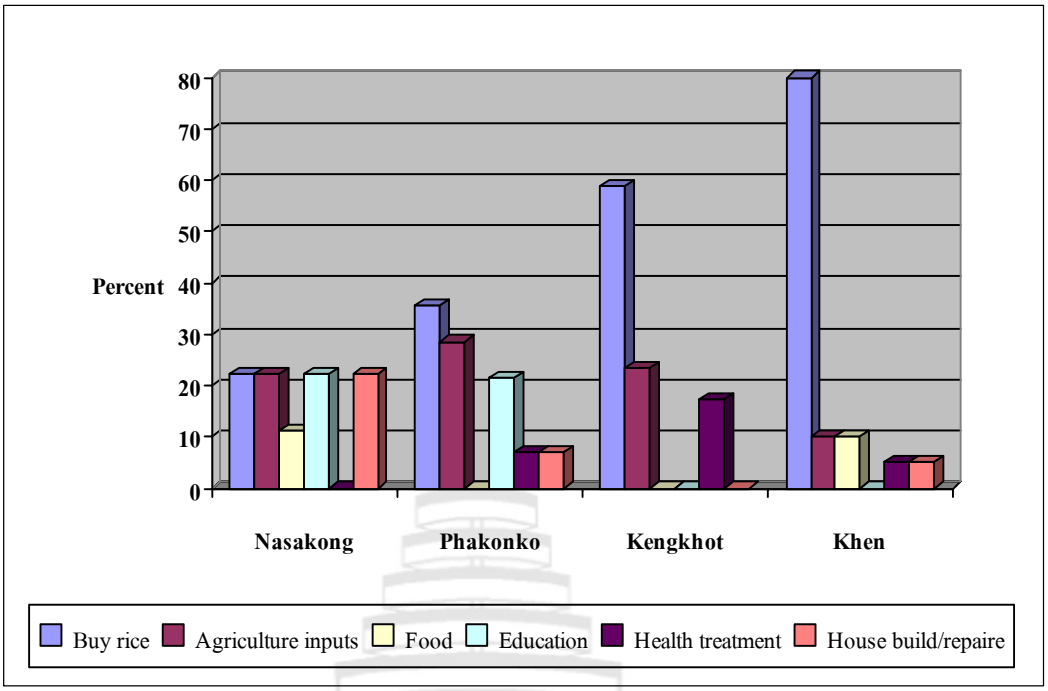


Figure 4.10 Main expenditures

Total average 56.7% of HH respondents the main expenditure is buying rice for consumption, 3.3% for health care, 10% for education, 6.7% for house build, 18.3% for agriculture inputs and other 5% for food. Khengkhot and Khen villages are most high expenditure for buy rice due to these villages is high percentage of insufficient rice consumption.

4.2 The socio- economic impacts of THPP in recipient river communities

The data of socio-economic impacts of THPP in recipient river communities is collected from group discussions and field surveys. The socio-economic impacts to the HH respondents stem from the consequences of three main environmental impacts; namely, (1) more flooding leading to loss of wet season rice crops, loss of livestock, difficult mobility, (2) changing water flows of the Nam Hai and Hinboun rivers leading to loss of access to clean water, loss of assets, sickness and loss of fish and aquatic life (loss of fisheries), and (3) riverbank erosion

which leads to loss of land and loss of access to good location for riverbank garden practices as shows in Table 4.1.

Table 4.1 Percent of impact from THPP operations

No	Problem	No of HH respondents	Percent
1	**More Flooding**	**60**	**100**
1.1	loss of wet season rice crop	60	100
1.2	Lost livestock	21	35
2	**Water flow changed**	**60**	**100**
2.1	Lost assets	11	18.3
2.2	Loss of access to clean water	60	100
2.3	Difficult mobility	37	61.6
2.4	Sickness	6	10
2.5	Decline of aquatic life (loss of fisheries)	60	100
3	**Riverbank Erosion**	**60**	**100**
3.1	Loss land	15	25
3.2	Loss of access to good location for riverbank gardens	37	61.7

4.2.1 More Floods

The diversion of water from the Nam Thuen into the Nam Hai and Nam Hinboun Rivers has increased the duration, depth and frequency of natural floods, and associated backwatering in rivers and streams draining into the Nam Hai and Nam Hinboun Rivers. (Norplan, 2007)

As the result of group discussions and interviews, 100% of all interviewees reported that greater flooding is the main problem caused by the THPP diversion of water from the Nam Theun River to the Nam Hai River and Nam Hiboun River. They attributed the worsening floods

to the increased flows released by the water discharges from the power project. The floods are more frequent, longer duration and the water quality poorer (high levels of turbidity).

Nasakong and Phakolko's villagers stated that before THPP construction, there used to be flooding once every five to ten years per time but in a short duration and not turbid. The villagers also stated one more cause to turbid water after road No 8 was built. Since the construction and operation of the THPP, the biggest impact has been the frequency and long duration of flooding on the villagers' rice production, especially, the practice of wet season paddy, abandoned paddy field, lost livestock, difficult mobility loss access to clean water, These results are clearly shown in Table 4.3.

4.2.1.1 Loss of wet season rice product and abandoned paddy field

Prolonging of the duration of floods and higher peak flood level causing inundation and more sediment deposits in paddies (Norplan, 1996, p. 63) the villagers have reported a significant drop in rice yields and production.

Rice is the main staple. Long duration and frequency of flooding damaged to paddy rice crop and unfortunately the pests destroyed the remaining crops after flooding, therefore the villagers get low productivity, insufficient rice to eat for the whole year as show in Figure 4.13.

Yields in villages along Nam Hai and Nam HinBoun areas were strongly affected by flooding of the Nam Hinboun River, despite 2007 being a relatively low rainfall year. It could be expected that yields in zone 3 for the 2009 would be less than 2008 due to 2008 being a relatively high rainfall year causing more extensive flooding and crop damage (THXP, 2008). Therefore there are 36 HH (78.3%) in Khen and 15 HH (57.7%) in Nasakong village have insufficient rice to eat for the whole year 2009. The villagers stated that before water discharged from THPP, they had higher production due to fertile soil, some villagers could sell rice to outsiders, and they always used rice for exchange of clothes, livestock, other food, etc. They stated that flooding occurred previously once every 5-10 years, but they generally managed to remain self-sufficient in rice by storing the harvests from good years to see them trough the years of major flooding when they got poor yields. For Lao local people when they have self-sufficiency in rice then they are not worried about other foods because they can explore in resources nearby their village.

When they have insufficient rice to eat for several months year-by-year, they are forced to sell their livestock as one source of income, even chickens they can raise for food as usual but for selling them so the number of livestock decrease and some households have no cattle. When the researcher asked them how often they use livestock for food, most of interviewees reported that they have to save them for cash and we only consume livestock when we have visitors (their friends, relationship or some visitors at a special occasion). In traditional occasion, and in harvest time, when they have no cash, they borrowed rice from others and returned it plus some "interest" after harvest and it is going to be worse if they have low yield as a result of floods and pests.

Case of Phakolko' villagers: One man reported that before the water diversion he never experienced total crop losses from floods because the flooding water was less turbid and the crops could tolerate being below water for a longer period. Since the THPP discharged water and the water has become turbid, 7-10 days has become the critical duration for flooding, beyond which the rice plants tend to rot and die. 2005 and 2007 he lost the entire yield from flooding and because of pests which damaged all the remains after flooding. This made his family have insufficient rice for the whole year. In fact, he has 3 ha of paddy land, and before dam construction he could get 3-4 tons per year and sold some for income, but after the water diversion he got 60-100 sacks, and this year he got only 40 sacks (30 kg per sack). Another woman added that even though her family has 1 ha of paddy field, her family has insufficient rice every year since discharges of water. Her family tries to practice in the same land every year because they have no choice, and hope that maybe the flood not hard as previous years or maybe there will have some yield left for harvest after the flooding, but they loss again and again even worse some years when they gained nothing that year. This family started in upland rice cultivation but unfortunately they always got low yield, only 7 sacks per year for 7 people. She estimated that they are rice insufficient for more than 10 months per year. They have no other property except a few livestock and their labours for rice.

Figure 4.11 Wet season rice products 2008 (Khen Village HH)

The photo was taken two months after harvest time. The rice shown was for four household's members.

The lost of wet season rice crop lead to abandoned paddy field. There are 28 HH (46.6%) of all respondents are abandoned paddy land after two years of THPP operation. The most highest percent of abandoned paddy land is Khen Village, but the lowest percent is Nasakong Village due to their location (see Figure 4.12).

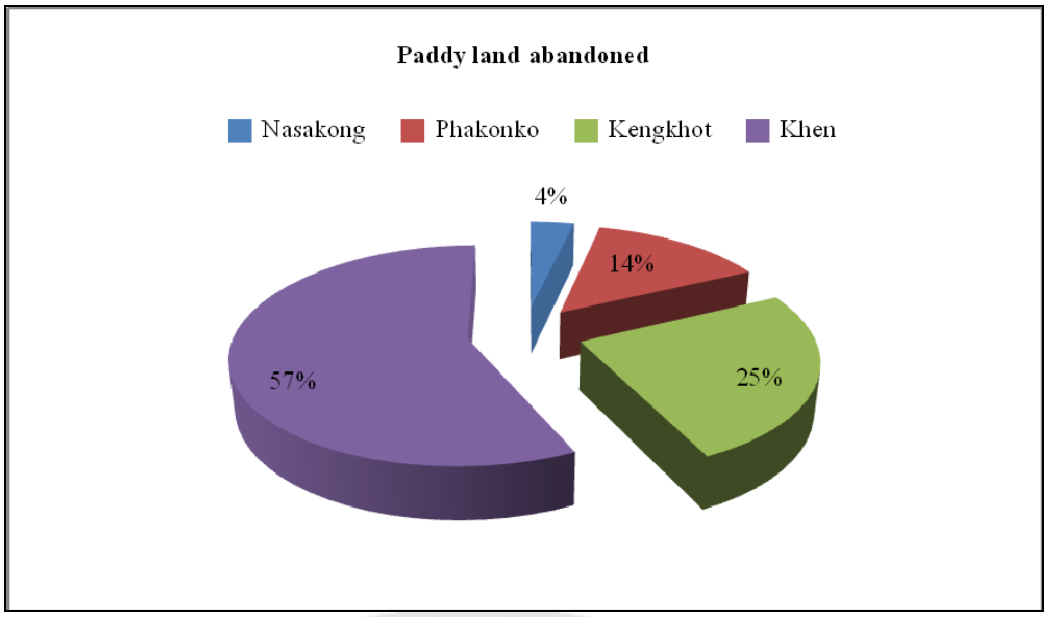


Figure 4.12 Present of paddy land abandoned

Khen' Village Headman and interviewees reported that they abandoned 2 paddy fields about 22 ha owned by17 households near Nam Hinboun River bank and opposite area to the village just after first year of THPP operation. Some of them abandoned 2 paddy fields because no matter how hard they tried, they could not get any rice to eat. The head man said that they no need to move if no THXP because they could reestablish new paddy fields in higher elevation place for avoiding flood and they have been reestablishing the fields for 4 years already. They tried to expand year-by-year and they estimated that they will have enough areas for their rice practice and have self-sufficient rice for the whole year after five years from now.

4.2.1.2 Loss of livestock

The livestock lost always occur during flooding. About 35% of all interviewees lost their livestock. The interviewees reported that their livestock numbers were deceased. This due to the fact that not only because selling them for rice, but also because of aggravation of flooding. When the flood runs fast, the villagers can not move away to the safe places so they leave their belongings behind and these assets are lost with the higher flows, such as poultry, pigs and cattle. While the flooding, they move their livestock to higher place and feed them with grass from other places. However, the grass is always scarce during flooding and not

enough for their livestock, so some of them get disease and die. The percentage of livestock lost for all interviewees in each village is shown in Figure 4.13.The loss of livestock is due to aggravation of flooding, shortage of grass during flooding and some loss due to disease after floods.

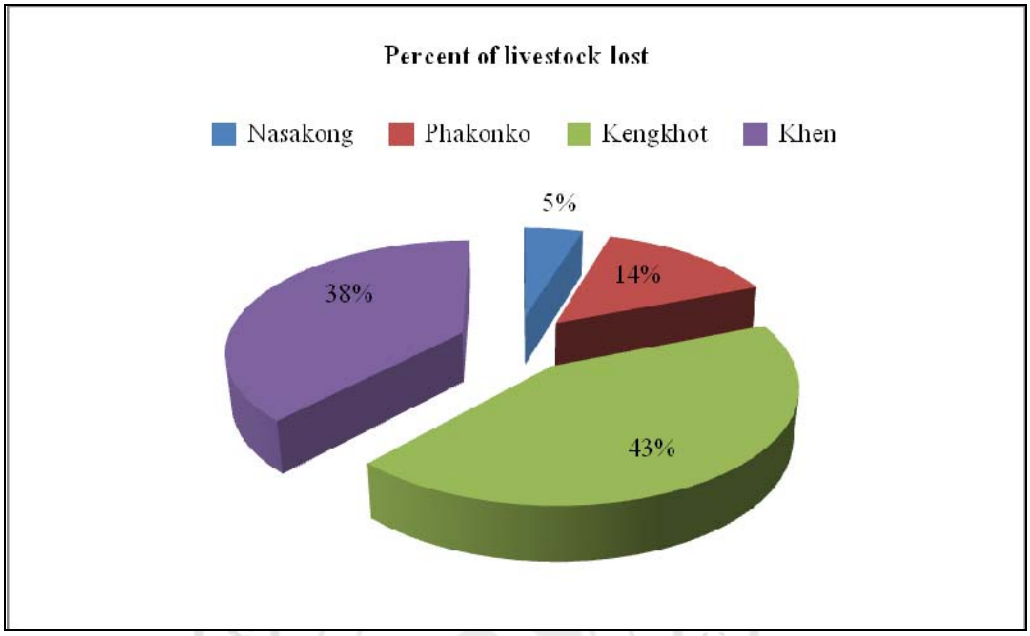


Figure 4.13 The villager's experience of lost livestock

The highest percent of HH that has experience with loss of livestock during flood is Kengkhot Village and the lowest percent is Nasakong Village due to Kengkhot Village located near along Nam Hinboun River and near the powerhouse than Nasakong Village.

Moreover there are 100% of all HH respondent reported that during flooding the villagers more suffering with difficult mobility, they have to use boats or canoes every time when they have to leave the house for food collection, for seeking clean drinking water, for livestock feeding, and even simple tasks like going to the toilet. For families who do not own a boat, floods are a period of extreme hardship, as they have to either wade through the floodwater or have to rely on borrowing a neighbors' boat. During flooding villagers more suffer with

drinking water shortage. They could store some rain water but they could use it for only a few days due to lack of a big tank for storing.

4.2.2 Water flow changed

All of HH respondents reported that the river water they formerly used for bathing, clothes washing, domestic supplies and drinking was now flowing much higher, stronger and dirtier than they had ever know it before THPP operation. The stronger and higher flow caused to loss assets (boats and fishing gears), lost access to clean water for domestic use and drink, Fish and aquatic decline as descript below.

4.2.2.1 Lost assets

There are 18.3% of all interviewees had experienced loss of assets. The main assets lost are canoe, boats and fishing gears especially villagers in Khen and Kengkhot villages due to being located along Hinboun River. Villagers reported that they loss their assets due to the beginning (high discharge) of discharge water from the power plant. Time table for water discharge depends on the request from Thailand electricity company (EGAT). The villagers never know and cannot predict when the higher discharges will come. For example, when water level become low then villagers put their fishing gears along river and left their boats on the river bank, but suddenly after the day in morning the water level becomes higher and washed those things away. The percent of assets lost in each village is presented in Table 4.2.

Table 4.2 Percent of assets lost

No	Village	No of HH respondents	Percent
1	Nasakong	0	0
2	Phakonko	0	0
3	Kengkhot	5	29.4
4	Khen	6	30
	Total	**11**	**18.3**

Nasakong and Phakonko villagers are not reported about assets lost, because these villages located far from Nam Hinboun River. Therefore there is low impact from water discharges from powerhouse.

4.2.2.2 Difficult mobility and lost access to clean water

One of the drawbacks from increases in the water level along the Nam Hai River during the dry season is the restriction of communications across the stream. Farmers in villages on both sides of the river will face difficulties in communication even during dry season (Norplan, 1996, p. 43).

In the past before water discharges from THPP during dry season, water in some part of Nam Hai river was almost dry, so villagers could across easily on foot, but after that high water level and rapid flow in both the Nam Hai river and the Nam Hiboun river, there is a serious problem and danger for villagers who use canoes to across rivers for agriculture practices, food exploration, etc. but these conditions can be convenient for motorboats.

Kengkhot and Khen' villagers reported that before the water discharged, they used the Nam Hinboun River for bathing, clothes washing, domestic use, fishing, navigation and even drinking water. They could enjoy their life. This life style was only in the past and would be no more. Currently they still have to use the water from this "new" river because they have no choice of other sources nearby. They could see clear water some time for few hours or few days only when the company turn off the turbines.

In the past during dry season when water level became low, villagers always made shallow wells in river bank for drinking, but now they could not do that because of river water level always changed and the level depends on the turning on and off of the turbines.

Khean' villagers have to take water from stream 2 km from village and spring at the foot of a limestone cliff 1,5 km from village. They claimed that they loss fuel for motorboats to transport drinking water from distant source of water. It is very hard work for the vulnerable people.

Kengkot Village has similar problems as Ban Khen because the village locates along Nam Hinboun River. The whole village has two wells but the water is always shortage in dry season. These wells are enough just for drinking and can not be used during flooding. There is one stream available for villagers in dry season, locating about 500 m far from the village.

There are two villagers in Kengkhot and Khen villages claimed that they health become poor cause of used turbid water for drink when the drinking water shortage.

For Nasakong village and Phakonko village, in dry season, there are no impacts from THPP because the village is far from Nam Hinboun about 4-6 km, but in wet season when Nam Hinboun becomes higher and pushes back Nam Ahoy river where the village is close to and receive some impact from this.

According to THXP baseline survey result, 15% of all households surveyed met all criteria for having access to an improved water source. In this case study only Nasakong villagers have sufficient access to clean water. Therefore the access to clean water from this study and THXP baseline results are similar.

The water is contaminated due to water discharges from THPP powerhouse and due to a long duration and frequency of floods. This contamination comes from the erosion of the river banks, loss of topsoil from the paddy fields, and high suspended solids in the runoff from adjacent fields.

Figure 4.14 Nam Hiboun River between Kengkhot village to Khen village in Jannuary 2009

4.2.2.3 Loss of fish and aquatic life

Traditionally, fish are important protein in household consumption as this protein source from freshwater streams is readily accessible to the local residents due to fact that all villages are located in close proximity to permanent stream or rivers.

All of interviewees (100%) and villagers who had been discussed with claimed that after water discharged from THPP powerhouse, fish and aquatic declines gradually year after year especially the aquatic shows the remarkable evident of the decrease. They could not catch much due to the hardship flow and turbid water except only when the water drops, but not much as usual. However, during wet season fishing is not as difficult as in dry season but not in Nam Hinboun River instead they mostly fish in the small streams, ponds and fields. Unfortunately, the number of fish catch in wet season is now the same as the amount caught in dry season in the past. Moreover, they have to spend much more time around 2-4 hours to fish but some time just enough for only one single meal (see figure 4.15).

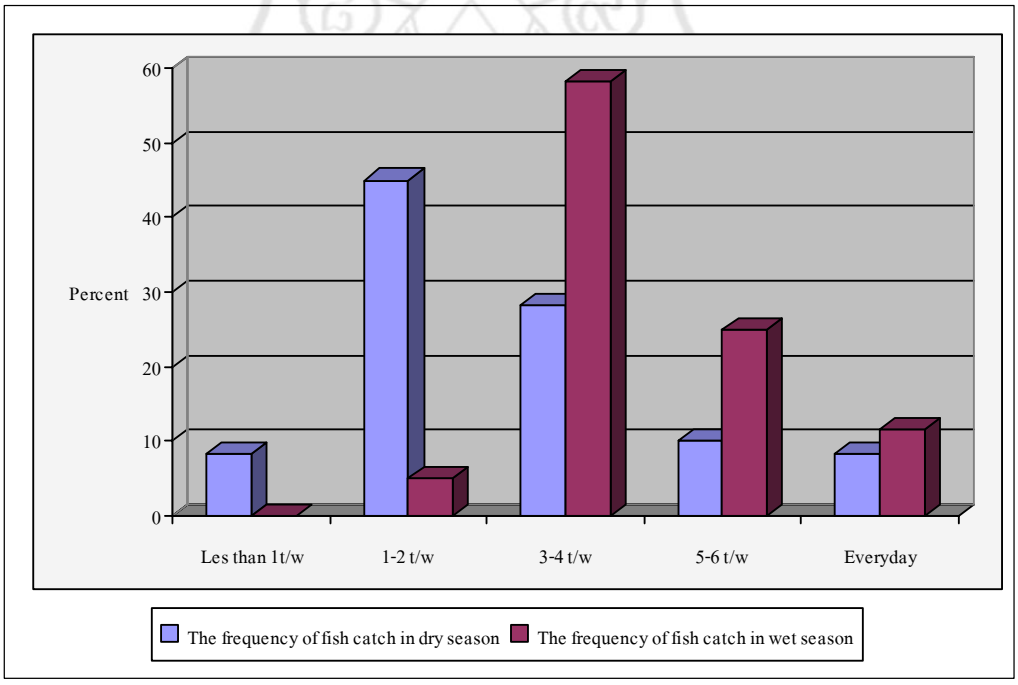


Figure 4.15 The frequency of fish catch during dry and wet seasons

The Figure 4.15 shows a difference of fish catch and consumption between dry and wet season and differences between the four villages. In dry season 8.3% are fishing less than 1 time/week, but 0% in wet season. Similarly 45% are fishing 1-2 time/week in the dry season but only 0% in the wet season (except for Nasakong village). This means in the wet season they can fish more than one time/week. The villagers in Kengkhot and Khen villages are fishing more frequency compare to Nasakong villagers and Phakonko villagers the main fish and aquatic source for Nasakong village and Phakonko village is from Nam Ahoy. It is a small river and there is little water flow in dry season, which can be difficult for fishing.

Generally, fisheries in the case study areas are degraded due to THPP impacts, over-fishing, and use of unsustainable fishing methods. The villagers use to eat other protein more frequency in dry season, the most common protein is frogs and crabs from streams, pond and rice fields.

4.2.3 Riverbank Erosion

The evident of riverbank erosion along Nam Hai River and below the confluence with Nam Hinboun River were clearly found during the field trip. The level of erosion increases year by year.

There are 15 HH (25%) of HH respondents in Kengkhot and Khen have lost land for riverbank gardens all of respondents are loss of access to good location for riverbank gardening. Before the water discharged from THPP, they could grow many kinds of vegetables for daily consumption and selling or exchanging some in the dry season. Now about 40% of families can do that on steep slop with narrow areas and of course it is not enough even for consumption. Many families clear land near their houses for home garden instead riverbank garden, but they have to spend much time and their effort to carry water from river through steep bank. It is also hard work, especially for girls and women, and they often look for natural vegetables in the forest and paddy fields at least 3 times per week, and spend more time than before.

Figure 4.16 Khen and Kengkhot riverbank gardens along the Nam Hinboun River

4.3 Compensation packages for effected communities in recipient river communities

According to villages' authorities and interviews reports, THPC compensated to each village as below**:**

4.3.1 Dry season paddy practice replaces wet season rice lost and corn crops

Nasakong and Phakonko villages have not been supported to grow rice by EMD due to low priority of impacts, but they were been provided with a corn crop plantation planted. There were 13 HH in each village (Nasakong 50% of total households and 35% of total households in Phakonko) planted corn crops in 2005-2006. The THPC subsidized corn seeds, diesel pumps, diesel, fertilizer and water pipes. This program was only run for one year because of low products.

Khen and Kengkot villages have been supported to do rice farming in dry season by EMD. It is an irrigation run by diesel pumps to feed water. Ban Kengkot had practiced for 3 years and Ban Khen had practiced for 2 years as presented in Table 4.5 below with the number of participated households and harvested yield:

Table 4.3 Dry season paddy rice practiced

Village	Year	Percent of HH participated	Total area (hector)	Yield Ton/hector	THPC subsidy
Kengkhot	2004-2005	24	55	1.64	1. Diesel pump
	2005-2006	88	123,067	3.52	2. Diesel
	2006-2007	52	110,96	1.92	3. Fertilizer
Khen	2004-2005	77	208,452	3.31	4. Pesticide
	2005-2006	52	118,400	1.52	5. EMD staffs assistance

Figure 4.17 Diesel pump in Nam Hinboun River

The THPC subsidy 100% for the first year and the participants had to return 30% out of their products to their own village' saving and credit fund after the harvest to be the collecting for funding of capital for future. The yield declined after the first year while the investment cost,

increased and other problems were the local seed usage, disease and pest increasing, delay onfertilizer and fuel delivery, water management system and operation life of pump.

4.3.2 Water supply for loss of access to clean water

The THPC supplied wells and concrete rings for each village. In Phakonko they had only one in new hamlet. In case of Khen villagers they received 2 wells but one could not be used after one week and other one could not be used after a month. For Ban Kengkhot the villagers received 2 wells of which one is still in use.

Nasakong village was provided with 2 wells which were only enough for drinking and kitchen use but water supply from these wells was always limited at the end of the dry season.

4.3.3 Theun-Hinboun garden provision

THPC provided garden for every HH with one plot for subsidy the loss of opportunities practice in riverbank garden due to riverbank erosion. The main purpose of these gardens is for vegetable consumption. EMD helped clear the land, provide food for work, and provide first basic aids such as a diesel pump, fuel, pipes, storage tanks for each households, fencing, fertilizer, fruit trees, seeds and other minor input. The number of HH who practice on these gardens has decreased year after year. The villagers attributed that their fruit trees die and the grass has growth up fast after flooding. Some villagers in Ban Khen planted papaya trees which gave big and lot of fruits but they could not sell due to far from market and even worse this species was not popular among customers. Some villagers taking some papayas to markets in downtown but the traders refused to buy them. The THPC However, this plantation will not be practiced any more in Kengkhot and Khen villages in this dry season (2008-2009) because THPC will not subsidize due to relocation until after settling down in the new area. The numbers of households practiced in dry season 2007-2008 are presented in Table 4.6 below:

Table 4.4 Number of HH, Size of areas and THPC subsidies for Dry season gardens practiced in 2007-2008

Village	Percent of HH practiced	Area (hector)	No of pump	THPC subsidy
Nasakong	46	19,200	1	1. Diesel pump
Phakonko	62	43,130	1	2. Diesel
Kengkot	48	32,200	2	3. Seed
Khen	75	57,600	1	4. Fruit tree seedling

The common vegetable are cabbages, cucumbers, corn, chili and long been. These vegetable are for consumption.

The number of HH practicing dry season gardens depends on the number of HH needs and their conditions pump availability, and diesel subsidy.

4.3.4 Livestock raising program

The program including Improve livestock management for all villages, pigs and chickens raising for Kengkhot and Khen villages. Each village received 1 pig and 100 chickens but Nasakong and Phakonko villages are not received due to low priority of impacts.

The Improved livestock management program includes village Veterinarians training, supply veterinary equipment, supply vaccination and treatment and livestock nutrition.

4.3.5 Health care

The program includes free health checks, child health care, training local give birth care, providing mosquito net, educating villagers about sexual diseases especially HIV, medicine cabinet with medicine revolving fund for village, birth control program, child nutrition check and providing milk and fish cans. The free health checks are assisted by trained nurses and doctors from hospitals in Hiboun district and a health team from SED. The SED provides some first aid but the villagers have to pay for more medicine when they need to treat themselves and even medicine for birth control pill (which is provided at a low price). The medicine cabinet is taken in

charge by local villagers who have been trained about basic health care. The cabinet is helpful for villagers as providing basic needs at a low price.

4.3.6 Savings and Credit Fund

The project has established a Savings and Credit fund in 49 communities where most of them have grown gradually and steadily. The Savings and Credit fund section has performed very well, as least in part due to good framework. The amount of fund in each village varies with the socio-economic condition of the village. Sustainability of the Savings and Credit fund depends on the activities promoted by the project, such as dry season rice, rain fed agriculture, and other income generating activities. (Blake, 2005).

The Savings and Credit fund in Ban Nasakong started in 2006 with 1,300,000 kip and then the amount of fund has increased due to increased number of participants. The participants have to pay 5000 kip per month to the fund and they can borrow money from the fund for different purposes. Most of their purposes are for buying rice to eat, health treatment and agriculture cost. Many of them could not pay back to the fund and 18 HH (69.23%) are in debt at the present.

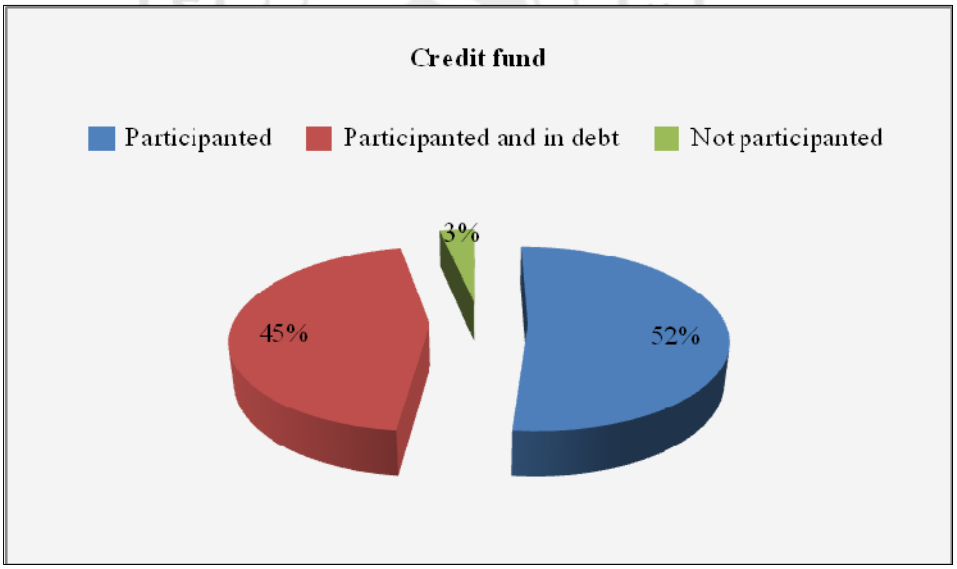


Figure 4.18 Credit fund issue all four villages

About 51.7% of all interviews had been participants and 45% of credit fund are in debt and only 3.3% were not participated. Since two past year, these funds have stopped because many households are in debt then this situation led any households to not continue. Phakonko Village has 15,000.000 kip in their credit fund. Most of the Khen's villagers do not continue this activity. They quoted that they have no money to save and there are 15 HH (31.25%) in debt.

4.3.7 Others compensation

Moreover, the THPC has improved access road in dry season, provided textbooks for primary schools in academic year 2005-2006, worked for money program in 2008 in resettlement areas.

Figure 4.19 Access road improved in dry season 2008

4.4 THXP compensation packages for relocation communities

4.4.1 THXP compensation packages plan

This plan is the preparation of the compensation packages, which includes: relocation, infrastructure development and livelihood improvement.

Relocation part: the THXP will support to the relocation: relocation site planning, provide at least 500 m2 per HH, houses and other structures dismantling, compensate for non-salvageable, and damage while dismantling materials, transport to the new site and building technical assistance.

Infrastructure development included: water supply for domestic use to every HH, electricity connection to every HH, improve all season access road, small clinic, temple, and primary school with six rooms.

Livelihood improvement package endeavors to achieve the family average annual target income of 14,200,000 kip (approximately 1,670 US). This target is calculated based on adequate expenses of an average family. The new social mitigation measure of livelihood options will be provided and implemented such as: (1) Forage Production and improved ruminant husbandry, (2) Pig and feed production and improved raising, (3) Poultry production for consumption and sale, (4) Fish and frog raising in ponds, (5) Cash crop production, (6) Cottage industry development, (7) Mixed Orchard/Plantations, (8) Rice production, ad training program for villagers. In additional there are rubber plantation for villagers, mushroom planting training, organic fertilizer production, and food distribution to the vulnerable.

4.4.2 Compensation packages process in Phoumakneng relocation site and livelihood improvement

Lao Regulation for Implementing Decree on Compensation and Resettlement of People Affected by Development Projects No. 2432 issued by STEA, Article 23 regulated that resettlement areas much be located on sites free from any environment risks or natural disaster and laid out in accordance with local prevailing planning standards with convenient access to: community facilities (schools, clinics, religious sites etc) and services (water supply, drainage, electricity, telecommunications as applicable); should be fully developed prior to displacement of affected peoples from their existing location (STEA, 2006).

THXP planned to move target villages during the dry season 2008 but that plan was delayed by the long delay in documentation requirements and availability of funds. Therefore the plan for relocation will be started in this dry season of 2009, and Khen Village is the first priority to be relocated.

The HH property survey had been finished and the company had cleared 30 ha of land in Phoumakneng relocation site (4 km far from road No 8 and) for residential settlement and basic infrastructure in the beginning of year 2008. Land is available and adequate for relocation and the primary school with 6 rooms is ready for use (see Figure 4. 20), but other infrastructures such as health care centre, water supply, access road, and electricity connection are still in the plan and will be started only after wet season because contractors cannot access to the relocation site also the bridge to cross Nam Ahoy that was built in the beginning of year 2008 with concrete had been destroyed by aggravation of flooding during the last wet season, therefore the basic infrastructures, may not be finished and may not be available for use in the beginning time of relocation.

Figure 4.20 Primary school in Phoumakneng relocation site (January, 2009**)**

The paddy land with dry season irrigation system that will be provided one hectare per HH also may not be complete in the end of year 2009 and could not practice, because dry season crop practice have to start from November. Therefore villagers have to continue to use wet season rice practice with high risk from aggravation of flooding damage to the rice crop as the same as previous years until the dry season paddy fields and irrigation system are completed.

4.5 Attitude of Villagers toward the THXP and Relocation

All of HH respondents are got information from THPC of THXP construction plan, the potential negative impact of THXP in recipient river communities and the company also informed them that they have to move to Phoumakneng relocation site, the compensations plans, their entitlements and the condition in relocate site.

Most 76.7% of all interviewees have seen the relocation site (Phoumakneng). There are 100% of villagers in Nasakong village and Phakonko village, because that site is not far from their village. They therefore can estimate that the site is adequate for relocation. 30% have reported that the site is suitable for relocation because of its high elevation compared to the present villages and it is located not far from road No 8 (main road). About 63.3% stated that the site is not suitable for relocation because limited land availability and other food resources, especially fish and aquatic resources. Only 6.7% could not estimate is the relocation site is adequate and acceptable. Therefore 35% of HH respondents are estimated that their life will be worse off than relocation, about 31.67% estimated that their life will be the similar before relocation, 15% cannot estimated and only 18.33% estimated that their life will be better than before relocation as presented in Figure 4.21.

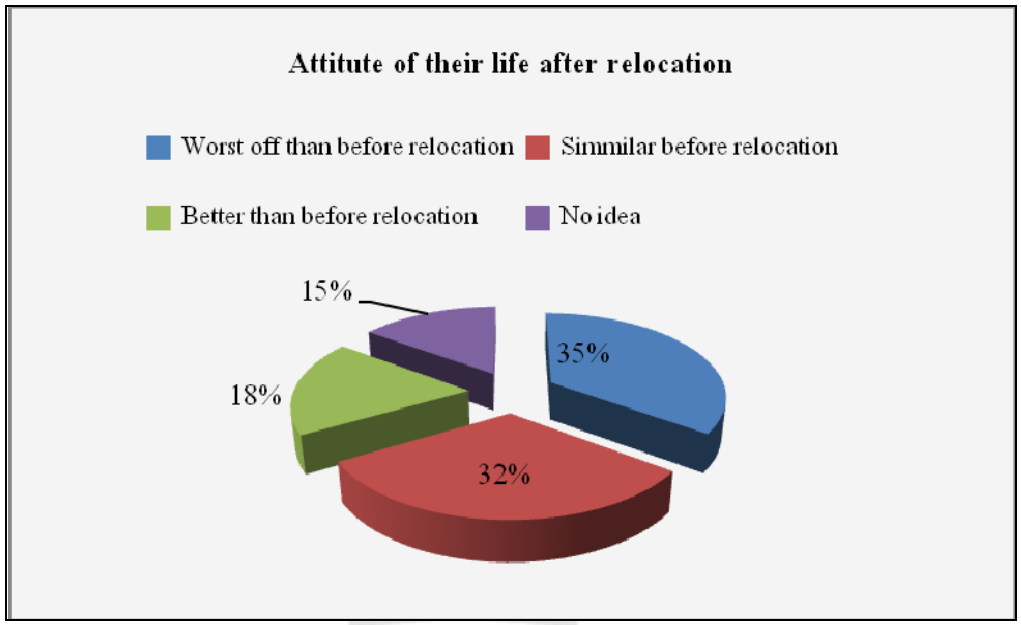


Figure 4.21 The attitude of HH respondents' about their life after relocation

The villagers believe that the THPC cannot make their life better than now if they have limited access to agriculture land and natural resource.

The villagers are waiting to see the relocation process, the compensation program during and after relocation provided by THXP. They are estimated that relocation time will be hard time for them due to movement of house materials, assets, properties and rebuild house in the empty land with no fruit tree, and some kind of vegetable surrounded their house as before. There are 41.7% accepted with the THXP compensation program if the program goes ahead as THXP had informed before. Most of accepted people are in Nasakong village and Phakonko village because their villages are near the relocation site. About 58.3 % have not accepted. Most of them are Khen and Kengkhot villagers because these villages are far from the relocation site as shown in Figure 4.22.

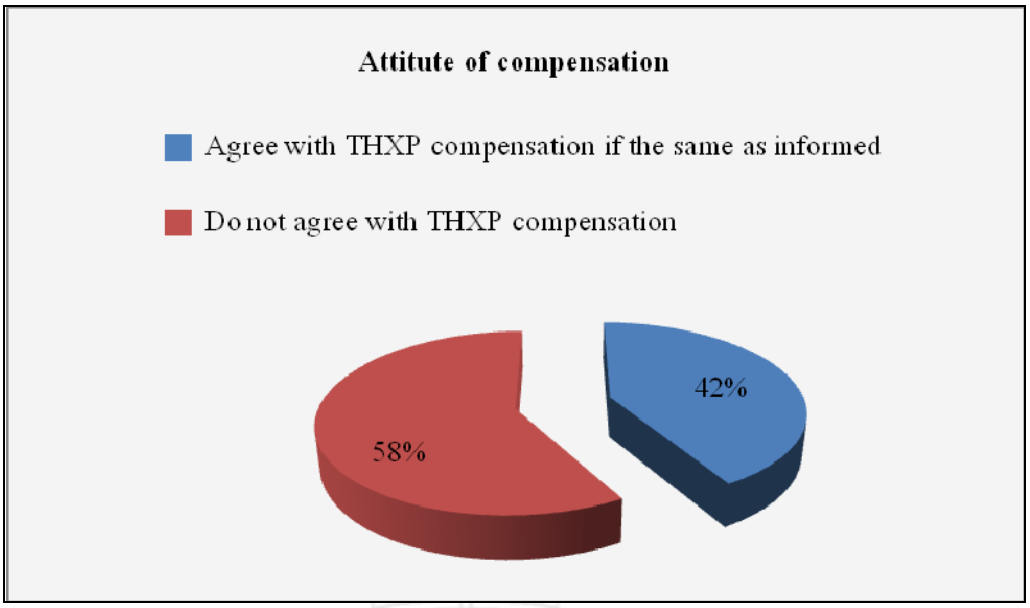


Figure 4.22 The HH respondents' attitudes of THXP compensation for relocation communities

All of HH respondents are worries about relocation issues. Most of the villagers stated that they would not have to move if there were no THXP. The main attitudes are presented in Table 4.5.

Table 4.5 Concerns of the relocation issue

Concern	No of HH responses	Percent
Relocation assistance	51	85
Relocation Facility	41	68.3
Agriculture land	49	81.7
Natural resource	47	67.3
Loss of Property in present village	40	66.7

Most of all households interviewed are concerning about access to agriculture land and food sources. They are all concerned about the level of compensation as they believe the plan is not

clear and unreliable, and the agriculture land might be inadequate if they are provided with just one ha for each family. In case of family who have 4- 6 children, how can they share that land for them when they have their own family? Almost all the land surrounding relocation area belongs to the Nasakong' villagers already, thus they believe that allocation of new land is very limited.

Table 4.6 Villagers expectations

No	Villagers requirement	No of HH response	Percent
1	Full compensation the same as Nam Theun 2 Project	10	16.7
2	Fair compensation	11	18.3
3	Cash compensation for all things lost	9	15
4	Compensation for agriculture land	5	8.3
5	Build new house prior relocation	27	45
6	Build the same present house	4	6.7
7	Improve access road to agriculture land in present villages	8	13.3
8	Provide dry season irrigation in present village	2	3.3
9	Livelihood improvement	6	10
10	Provide more agriculture land	3	5

Most of all households believe that they need more compensation for all things lost (agriculture land, fruit trees, house and other material) either in cash or in kind. Many HH in Khen Village and Kengkhot Village have requested full compensation the same as resettlement case nearby the reservoir. They claimed that their villages far from relocation site 10 to 15 km, so they could not use their land and all properties in old village with poor access road even during the dry season. Many households request for more agriculture land, because their food security depend on agriculture practice system.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

The study of socio-economic impacts of THPP to recipient river communities in Hinboun district, Khammuan province, Lao PDR, by review of secondary data of project proponents, NGOs documents related to the THPP as well as hydropower project development and primary data from field survey research analysis leads to several conclusions and recommendations. These are outlined as follows.

5 Conclusions

5.1.1 Main socio-economic impacts of THPP in recipient river communities

The results of data analysis can conclude that the main environmental problems in recipient river communities are more frequent and longer duration of floods leading to loss of wet season rice crops, abandonment of paddy land, insufficient rice consumption for the whole year, fish and aquatic decline, loss of access to clean water, and riverbank erosion which leads to loss of access to good location for riverbank garden practices as shown in the Table 4.1, section 4.2.

The insufficient rice consumption is the most serious problem as rice is the main stable for Lao people. The most affected village in the case study is Khen village and the second is Kengkhot Village due to their location along the Nam Hinboun River.

Table 5.1 Comparison of the study results to published data from the project proponents and the comments made by the NGOs

Project proponents data	Study results	NGOs comments
1. Loss of dry season riverbank garden, which were an important source of food and income 2. Loss of access to traditional fishing and fish breeding areas, which are an important protein source for villagers. 3. Erosion along sections of the Hai and Hinboun rivers, which cause loss of land and access to clean water supplies. 4. Loss of income by villagers due to delays by the company in taking action to solve the problems cause by the project.	1. More frequency and long duration of flood is the main cause to loss wet season rice crop, and abandoned wild paddy fields which were an important source for food security. 2. Fish and aquatic declined 3. Loss of access to clean water due to effected from water discharge from Theun-Hinboun powerhouse 4. Loss of access to riverbank gardens practice due to Hinboun riverbank erosion.	1. Flow regime alteration 2. Aggravation of flooding lead to loss wet season rice products, abandoned paddy fields, loss of mobility and ease of movement during floods, loss of livestock and other property to floods, decline in availability of food and spoiling of food, for both human and livestock and death of beneficial plants and trees. 3. Fish and aquatic resources decline 4. Changes in domestic water quality and availability 5. Riverbank erosion and sedimentation

Overall the major impacts from THPP operation by project proponents, research study, and NGOs reports are similar as shows in Table 5.1: the comparative of the study results to project proponents and NGOs studies. Thus impacts pose riverbank erosion, fish and aquatic decline, and loss of access to clean water is the major impacts highlighted in all three studies. The THXP baseline data reported about food security in recipient river communities that is caused by THPP operation, but did not identify the level of such impact. These results confirm the information that had been gathered through consultations on village concerns and the efforts being made by the project to address the food security issue along the Nam Hai River.

The main impacts that reported by NGOs claim that there are caused by THPP only. This study can conclude that the more frequent and longer duration of floods and loss of wet season rice crop there have more addition causes to these impacts. According to hydrological study and Hydrodynamic Modeling of the Nam Hai and Nam Hinboun Rivers by SWECO, April 2007 it is reported that in the Nam Hinboun River, the effects of THPC releases are considerably less. The mean annual flood at study time only increased with some 10% and the 100-years flood by some 5%. However the photos from GIS study (1992-2008) show that the forest cover has been converted from natural forests to different plantation crops upstream of the dam site. Moreover forests along Nam Hai River and Nam Hinboun River have been destroyed by different activities by both inside and outside people, trees along Nam Hai River and Nam Hinboun River are being cut for tobacco plantation and for upland rice practices. The researcher has also seen the evidence from field survey observations. The land clearing serves as an accumulative impact to THPP operations and the flooding impact is more severe than previously reported because of the loss of forests and thus the loss of retention of runoff in the watershed areas.

Figure 5.1 Land clearing for plantation in upstream of THPP (May, 2008)

The loss of wet season rice crop is caused by the aggravation of flooding and long duration and water turbidity. Moreover most of villagers and SED's staffs who work in livelihood improvement stated that the pests always damage the remaining wet season rice crop after flooding.

Fish and aquatic decline are due to water discharges from the Theun-Hinboun power house and hardship flow regime is presented in section 4.2.2.3 in addition unsustainable fishing by some fishermen is an additional cause to fish and aquatic degradation.

5.1.2 The evaluation of THPC compensation packages

The THPC compensation packages have been implemented in four target villages. These are dry season rice crop with fuel irrigation pump support to replace wet season rice crop lost, providing Theun-Hinboun gardens to replace the loss of riverbank gardens, drinking water supply, livestock raising program, health care, and establishment of a Savings and Credit Fund. Moreover, the THPC has improved the access road in the dry season and provided textbooks for primary schools in academic year 2005-2006.

There is no direct compensation or cash compensation for affected peoples in four target villages for any lost things. The dry season rice produce can not replace the loss of wet season rice production due to high costs of investment and low yields. Many HHs abandoned their paddy land and about 30% of households of all interviewees have insufficient rice for consumption every year since THPP began operation. Most interviewees claimed that their livelihood is worst off with the project than before.

Drinking water supply could not be used in Khen Village. Many villagers are in debt with saving and credit fund. The livestock raising program failed due to disease.

THXP mitigation and compensation measures are implementing such as frog and fish feeding in pond, Theun-Hinboun gardens and material for animal pen roofing. The construction development in Poumakneng relocation site are completed only land clearance for relocation and the primary school with 6 rooms are available for use (Figure 4.22, section 4.4.2)), but other infrastructures such as health care centre, water supply, access road, and electricity connection are still in the planning stage only. The dry season paddy land with irrigation system with relocation activity will start to operate in the dry season of 2009-2010.

In the relocation site, villagers will have more expenditure for electricity and water supply consumption. Fish consumption may decrease (quantity and frequency) especially vulnerable group because they have limited fish sources (stream and pond), only Nam Ahoy is located at a small river where they can catch fish but it has pressure with illegal fishing by villagers nearby and outsiders. The main concern for villagers is access to agriculture land and food resources for both human and cattle.

The individual researchers and groups of NGOs (see section 2.5) always complain that THPP had inadequate compensation package for all affected people. The 2001 mitigation and compensation program that was developed to resolve the major impacts has had few concrete successes after six years of implementation such as: no compensation for loss fisheries, no compensation had been paid for the massive rice paddy abandonment, the dry season vegetable garden program has met limited success due to lack of markets for products, the extra labour required, pump breakdown, fence failure, crop disease and loss of fruit trees from flooding, and the dry season rice irrigation scheme, after an initial bumper crop, has seen universal decline in

yields over the past five years. The RAP of THXP proposes replacing losses with livelihood restoration programs failed to draw lessons from the successes and failures of the mitigation and compensation program of the existing project, or from the Nam Theun 2 Hydropower Project. As such, THXP is poised to repeat past mistakes. Ten years after the Theun-Hinboun project began operating, communities are worse off than they were before project development (Imhof, 2008).

According to conversation between researcher and Dr. Stephen Sparks, the SED Manager of THXP on April 2008, he stated that the THXP is trying hard to resolve the problems caused by THPP and THXP. It is expected that the RAP of THXP will restore and improve the livelihoods of all effected peoples. The THXP entitlements objective is to provide full compensation for all PAPs to ensure outcomes are better than pre-project conditions. In addition to this, THXP will endeavor to ensure that all PAPs have access to livelihoods which are sufficient and sustainable. THXP has commitment to support PAPs until they reach specified income targets (Norplan, 2007).

THXP mitigation and compensation packages plan for effected people from the existing project and from the proposed new project are useful for livelihood improvement, but that plan was delayed by the long delay in documentation requirements and availability of funds. Therefore it is can estimated that these proposed packages are inadequate to restore livelihood and food security for recipient river communities in the first two years after relocated. Whether these packages will be successful or fail is dependent upon their implementation. This will be the proposed subject of future research to evaluate the adequacy and effectiveness of the implemented THXP program in the next four or five years.

Table 5.2 Comparison of Welfare and Livelihood Improvement Program for Project Affected People (present only in case study)

Mitigation measure	Available from THPP	Committed by THXP
1. restoration of water supply for human consumption	Dig a village well 2 wells/village	Deep tube well and provide village storage tank, Provide pipeline to individual households
2. Water supply for gardening and dry season paddy crop	Diesel pump	Electricity pump and small irrigation system
3. Protein replacement 3.1 improve livestock management	Pig and chicken Trained village veterinarians, supply veterinary equipment, supply vaccination and treatment and livestock nutrition	Pig, chicken, fish, frog Trained village veterinarians, supply veterinary equipment, supply vaccination and treatment and livestock nutrition and provide materials for animal pen
3.2 built Animal Breeding center(ABC)	Animal breeding	Animal breeding
3.3 pilot unit for protein replacement (frog, fish, chicken, pig)	Provide breed and breeding for extension support, feeding improvement	Provide breeding, and animal feed
4. Cash crop production	Dry season gardening, seed provide, technical training	Dry season gardening, seed providing, mushroom planting
5. Forage Production	Provide seed and seedling, fencing	Mixed Orchard, seedling

Table 5.2 (continued)

Mitigation measure	Available from THPP	Committed by THXP
6. Rice Production	Diesel for water pump for dry season rice, fertilizer, seed, technical advice	Diesel for water pump for dry season rice, fertilizer, seed, technical advice
7. Cottage industry development	No	Provide Industrial tree, rubber tree plantation
8. School	Provided textbooks	Built primary school
9. Access road	Improved access road	All year access road to relocation site
9. Electricity	No	Connect electricity to every household
10. Health Care	Mosquito net, toilet building, traditional birth attendance, drug fund, health and nutrition awareness	Built new health center, improve existing programs, improve district level network
11. Credit Fund	Training, cash contribution, following up	Hand over to district responsibility
12. Income Improvement	No target	7% increase in disposal income per year, about 1,670 USD/family/year

5.2 Recommendations

Any development projects are the purposes to improve livelihoods and to be better socio-economic not only in the local levels but the national levels as well. In contrast those

projects also have negatives direct impact to the local livelihood where the projects fall in, the government therefore should have more enforcement in terms of operating and monitoring.

The government representatives who are involved in the particular project should listen to any problem raise by the local communities then presents those issues to the related sectors from district, province up to national levels in order to find out the appropriated solutions as soon as possible.

Moreover, the government should learn from any lessons in any similar projects in order to avoid repeated mistakes or take some successful points to be applied for. Relevant Lao laws on hydropower especially in the part of compensations and resettlements should be more enforced and implemented strictly.

The THPC should also consider / take into account for the followings issues.

1. The community facilities (school, health care center, temple) and other service (water supply, access road and electricity) should be fully developed prior to displacement of affected peoples from their existing location.

2. The first priority for livelihood improvement should be to ensure that the villagers are not suffering with insufficient rice to eat for the whole years as before relocation.

3. More strict on decision making process. Lao laws and degrees enforcement for all development projects. Monitoring on mitigation and compensation program and

4. The second priority is to urgent by provide land for cash crop and other kinds of crop in short rotation for subsistence and local market.

5. Some trees shades remain standing or closed be planted on relocation sites for shade. It is important to provide trees for shade and other kinds of fruit trees that can be growth fast to villagers to grow surrounding their residential land because these trees can protect soil erosion, give fruit and the shade of these trees will help villagers not suffer in the host season.

6. Land field requirement for relocation site and educate villagers how to reduce and manage their waste from daily use because it is can help their relocate side

7. Land field requirement for relocation site and educate villagers how to reduce and manage their waste from daily use because it is can help their relocate side clean.

8. Educate villagers for sustainable natural resources use

9. Skill Labours training cause should be provides for improving their skill in handicraft, woodcarving, construction (houses build) for help villagers to have opportunity to have extra job and make more income

5.2.1 Limitations of research

Since the limited time of the research in comparison to the project relocation time, it cannot cover the time of compensation; this research is therefore just able to predict those compensations base on THXP project plans.

The data analysis could not be use correlation analysis and the researcher was unable to use specific factor analysis such as Principle Component Analysis because most of data are qualitative.

5.2.2 Suggestions for future research

This research might be a part of socio-economic situation before relocation and also baseline information for many case of hydrology development in Lao PDR for impacts mitigation, compensation plan and livelihood improvement for all effected people. There should be continues research after relocation.

This research interviewed about 60% of all HH so future research should consider all HH (100%) and then statistical analysis should be applied.

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APPENDIX

Household Questionnaire for Socio-economic Impacts of Theun_Hinboun Hydropower Project on Recipient River Communities, Lao PDR

(Before relocation)

Code – Household No…….

Village……Hinboun district, Khammoun province

Interviewer Name: …….. Date: ……. ……...

Name of HH Head……...

1. General Household Information

1.1 Name of respondent: …….

Sex: ☐ Male, ☐ Female,

1.2. Age ……years old

1.3. Religion

☐ Buddhist

☐ Others (please specify)……

1.4. Highest education level of the respondent

☐ Illiterate

☐ Primary

☐ Lower Secondary

☐ Secondary

☐ Higher

1.5. Are you originally from this village? ☐ yes, ☐ no

If no, where did you come from? ……

What the main reason for moving here?.... …….

1.6. Are there any household members who are temporally residing elsewhere?

☐ Yes, where?.....,for what reason?.....

☐ No

1.7. Are there any household members who are permanently residing elsewhere?

☐ Yes, where?....., for what reason?.....

☐ no

1. 9. 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		

1. 10. 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 garden					

A. Does your family have rice to eat for the whole year? ☐ yes, ☐ no

B. For how many months each year does your household have insufficient rice to eat?.....(months)

C. What does your family do to get more rice? ☐ buy, (where money come from?)

☐ Borrow, ☐ eat another food, ☐ hunger

1.11. Food consumption

No	Kind of food	T/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							

1.12. Main income sources

No	Item	Tick
1	Agriculture product	
2	Livestock	
3	NTFP	
4	Labor wage	
6	Fishery	
7	Salary	
8	Service	

1.13 Main expenditure (Cash purchases)

No	Item	Tick
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	

2. Main impact from dam operation and compensation and compensation.

No	Type of impact	Impact?	
		Yes	No
1	**More flooding**		
1.1	loss of wet season rice crop		
1.2	Lost livestock		
1.3	Difficult mobility		
2	**Water flow changed**		
2.1	Lost assets		
2.2	Loss of access to clean water		
2.3	Sickness		
3	**Loss of access to riverbank gardens**		

Does your family abandoned agriculture land cause of flooding? ☐ yes, ☐ no

If yes, what type ?....., area…….ha, how long……..years.

Did you get any compensation? ☐ yes, ☐ no

No	Type of impact	Did you get compensation?		What kind of compensation?
		Yes	No	
1	**More flooding**			
1.1	loss of wet season rice crop			
1.2	Abandoned paddy land			
1.3	Lost livestock			
1.4	Difficult mobility			
2	Water flow changed			
2.1	Lost assets			
2.2	Loss of access to clean water			
2.3	Sickness			
2.4	Fish and aquatic life decline (loss of fishery)			
3	Riverbank Erosion			
3.1	Loss land			
3.2	Loss of access to good location for riverbank gardens			

Do you get any advantage from THPP operation?.....

…….....

3. Relocation issue

3.1. What information did you get before relocation?

☐ Impact from expansion dam ☐ Relocation issue ☐ your entitlement

☐ The conditions in relocation area ☐ other

3.2. Have you ever seen relocation area? ☐ yes, ☐ no

It there suitable enough for relocates? ☐ yes, ☐ no

Why?.....

.....

3.3. What do you estimate your life after relocated? ☐ Better than before relocated,

☐ Worst than before relocated, ☐ the same as before relocation

What your reason…….....

……..

3. 4. What your concern about relocation?

☐ Residential ☐ relocation facilities ☐ living conditions

☐ Access to natural resources ☐ access to agriculture land ☐ assets in your old village

3.5. What your comment about dam?

……

……

3.6. What your expectation from relocation site?

……

……

CURRICULUM VITAE

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EDUCATIONAL BACKGROUND

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