

CHAPTER - I

INTRODUCTION

1.1 Background

Major energy consumption in Nepal is made up of firewood, hydroelectricity, coal and oil products. Noncommercial energy sources, such as wood, animal wastes, and crop residues, account for a significant share of the country's total energy consumption. Nepal is a net energy importer. Nepal has been meeting its energy demands through petroleum products from India. But with import bills amounting to over 60 percent of the country's export earnings, and the international price of oil on the rise, this is far from sustainable. (Rai, 2011)

Also, renewable energy, including micro-hydro, biomass, solar energy, etc. is gaining popularity in Nepal, particularly in remote regions of the country. Rural electrification is a main priority of Nepal's Periodic Plan. "Millennium Development Goals Needs Assessment for Nepal, 2010" has stated that Nepal has one of the world's lowest rates of per capita electricity consumption, with an average of 80 kWh annually. Some 83.7 percent of the population still relies on traditional biomass fuels for cooking and heating. (Economic survey, 2011/12). Alternative energy sources are being harnessed together with water resources for providing modern energy services such as lighting, heat for cooking and space-heating, and power for transport, water pumping, grinding and numerous other uses. Nepal is rich in sources of clean energy but it has been only marginally successful at harnessing these sources. As a result, traditional energy sources still play a dominant role in energy supply of 87.1 percent of total energy, commercial sources for 12.2 percent and renewable sources for 0.7 percent (WECS 2010).

Hydropower, the major source of Electricity, is considered as a renewable resource, efficient, and reliable source of energy that does not directly emit greenhouse gases or other air pollutants, and that can be scheduled to produce power as needed, depending on water availability. Nepal has 6000 small and big rivers hurling from Himalayas to the sloppy Hills such as streams, rivulets, glaciers, lakes and ponds. With all those beautiful rivers, the total hydropower potential of Nepal was assessed as 83,500 MW in 1966 by Dr. Hari Man Shrestha during his PhD research work in former USSR. Since then, no further study has been done in this field. (Jha, 2010) Out of which 42500 MW (NEA, 2006) are economically feasible. In fiscal year 2009/10, the total production of electricity is 751 MW including

Thermal Plant (53.4MW) and Solar Energy Plant (100KW). So far, Nepal has been successful in producing only 697 MW electricity. (Economic Survey, 2009/10). Another data still showing that electricity generation by mid-march of 2011/12 has reached 705.6 MW only.(Economic survey,2011/12). Though the first hydropower was installed in 1911, the hydropower development followed very sluggish path as a result of which power cut is daily routine of people in Nepal.

Paraguay has 5 million people, Bhutan has 0.6 million people and Nepal has 27 million, all small land locked countries with rich hydropower potential. The 12600 MW Itaipu project commission on Paraguay- brazil border river Parana was the world's largest hydropower plant until China's Three Gorges superseded it in 2007. Paraguay's share half of Itaipu's generation is on average of about 44000 million units annually with over 90 percentage sold to Brazil. Nepal's projected average annual generation from three major multipurpose projects at Saptakoshi, karnali chisapani and pancheshwar's 50 percentage totals about the same. Despite two decades of such large volume of power exports, however Paraguay remains the second poorest country in South America. Nepal, with a tiny 550MW of hydropower capacity is undergoing bouts of load shedding and is mired in controversies. Bhutan, with a mere export of about 1300MW, comprising 60 percentage of the national revenue has therefore been strongly recommended as the models for Nepal to replicate. (Pun S.B., 2008)

Hydro power project is a good alternative for Nepal as such projects has adverse environmental impact of social, biological and physical environment. The successful implementation of a hydropower project requires excellent community relations. Local communities recognize that construction of hydropower projects is a ready source of revenue that can be tapped for local projects such as road building, trail improvements, schools, temples, water supplies, rural electrification, etc. But without the participation of the local people, the projects can never be succeeded. The involvement and participation of the public is crucial to project success.

The impacts of some major projects are sometimes considered as positive or negative. In less developed countries, awareness and appreciation for both the opportunities and risks involved are often beyond the comprehension of local people.

1.2 Statement of the Problem

Agriculture is the major occupation of the people in the remote area. After the commencement of the hydro power project, total agricultural production in the concerned area may decrease due to decrement of cultivated land. The farmers are provided certain amount as compensation of the productive land that will not last long for their livelihood. The alternate could be change in agriculture practice or temporary migration of the people for the employment.

Most of the people know the immense importance of the hydro power project and its necessity as the essential components for the human beings, but the people of the project implementing area do not appreciate easily at the project implementation time and perhaps some years long too because of the inadequate rapport established between the project and the people. Even the people do not want to have interaction between projects either directly or indirectly as well as immediately. Probably, the economic and social structure of the people compelled them to create such disputes. They have uncountable need to be fulfilled as much possibly. So, to assess the perception of people towards the project, this study has been conducted. And also the study was tried to analyze the existing socio economic condition. In brief, present study tries to explore perception of local people about Upper Trisuli 3A Hydropower project. In this context, local people's positive as well as negative, both types of perceptions are analyzed.

1.3 Objectives of the Study

The general objectives of the study are mentioned below:

-) To analyze the socio-economic condition of the people around.
-) To access the perception of the people towards the Upper Trishuli 3A Hydro power project with detail of project description and concerned area.

1.4 Justification of the Study

Nepal possesses higher potentiality to generate the excessive amount of hydro power electricity, though very little achievements are achieved till now. The present hydro projects are also centered to urban areas. To facilitate the rural people, small and medium hydro

power projects should be generated in feasible areas. The non-renewable sources of energy such as fire woods, coals, etc. will be shortage in coming future. So, the renewable sources of energy such as Hydro power projects should be designed that help to uplift the life of rural people. With the development of such projects, infrastructures such as roads, markets as well as economical activities will obviously take a turn. Hydro power provides employment to the local people that control them to migrate in quest of better future. The expenses we use to import petroleum products can be used in other developmental activities if we can use Hydroelectricity as the alternative means of petroleum. Nepalese people are facing the serious illness of power cut. If the numerous number of hydroelectricity projects are installed, the daily problem such as power cut will be solved and every citizen will be benefited. Though the concerned area is being benefited with these facilities, this research is worth to analyze the people's perception towards the development of hydropower project.

In the light of this background, it was essential to carry out the study including inventory of all infrastructures components existing in the study area, socio-economic status of the people, their prioritized demands, resource identification and finally the recommendations for the future programs of action. So the study has attempted a qualitative analysis and simple description of the situation of the study area. So, it is hoped that the findings of this study will be useful to the concerned authorities, administrations, policy and decision makers to estimate potential resources and assess and evaluate closely to the real needs of the people and finally to determine the key sectors for the implementation of program in forth coming year.

1.5 Limitations of the Study

This study is limited only on four VDCs of Rasuwa (Dandagaun, Ramche and Laharepauwa) and Nuwakot (Manakamana) district. Field survey will be conducted only once. Limited budget, time and small sample size are the limitations of the study. Because of the limited time, the study may not cover the analysis of long term issues and impacts in detail. Because of the lack of sufficient knowledge about the affected people, the data from social survey may not provide the exact picture of the society but reflects the average view.

CHAPTER - II

RESEARCH METHODOLOGY

2.1 Study Area

There are 61 VDCs in Nuwakot district and 18 VDCs in Rasuwa district. The affected VDCs of the proposed project are Dandagaun, Ramche, Thulogaun and Laharepauwa VDCs of Rasuwa district and Manakamana VDC of Nuwakot district. The total population of these five VDCs is 14,682 and the male female ratio is 49.96 percentages and 50.04 percentages respectively. The total number of households in the project area is 2,727 and average household size is 5.38, which is similar to the district average. (Source District Development Profile of Nepal, 2004).

2.2 Identification of Project Affected Families

All of the families who lost land and their houses due to the construction of proposed Trisuli- 3A are classified as Highly Affected Families (HAF) and those who lost their land and other asset during the extension of road and land lease are classified as Less Affected Families (LAF). To identify all the land and house owners of all the parcel numbers affected by channel, foreway, powerhouse and other components of the proposed project, the project report and help of local people. Most of HAF group belongs to channel, foreway, powerhouse area of Trishuli 3A hydropower project. Similarly, most of the LAF group belongs to extended road side, area of temporary camp at headworks and employer camp as well as short term house and land lease. After finalizing the list of HAF and LAF, following methods was implemented to collect the baseline information.

2.3 Research Design

This study is mainly based upon qualitative data. This is a descriptive type of research because it is a fact finding investigation with adequate interpretation in the context of social research. It is more specific than exploratory study as it aims to identify the various socio-economic characteristics of the community

2.4 Sample Size and Technique

The area of Rasuwa and Nuwakot district is 1,121 and 1,544 sq.km and the population of these districts is 43,906 and 288,478 respectively. Out of 43,906 population in Rasuwa 22,552 (51.36 percentage) are male and 21,354 (48.64 percentage) are female. Similarly, in Nuwakot out of total population of 288,478, 142,731 (49.48 percentage) are male and 145,747 (50.52 percentage) are female. . (Source District Development Profile of Nepal, 2004).The Trisuli-3A Hydropower plant has affected households residing in four different VDCs namely Dandagaun, Manakamana, Ramche, and Laharepauwa. Approximately 250 households from among these four VDCs have been closely affected by the hydropower project.

The family who are directly affected by losing house, godh, toilet, large number of fertile land are classified as a Highly Affected Family (HAF) and family who lose their land, forest in less in amount for extension of road or project work are classified as Less Affected Family (LAF). Out of 250 affected households, 60 households have been selected among 150 total highly affected families (HAF) and 40 households are selected as sample households from less affected families among 100 total less affected families (LAF) for the purpose of the study. Simple random sampling has been adopted to determine sample households from each of the four VDCs.

2.5 Methods of Collecting Primary Data

For the collection of information about socio-economic and environmental impact and perception of people regarding Upper Trishuli 3A Hydropower plant. The questionnaire was designed with the help of respected supervisor, Assoc. Prof. Dr. Kamal Raj Dhungel of Central Department of Economics.

The questionnaire consisted open-ended as well as closed ended questions. The questionnaire is divided into four sections. First section of questionnaire covers socio-economic impact, second section covers the development of infrastructure. Ongoing part covers the income source and final part covers people's perception regarding hydropower project.

In this study, primary data has been collected through a field survey of the project affected sites. Some of the methods or tools applied while collecting primary data are mentioned as below:

-) Observation: The researcher visited the project site and thoroughly observed the project site influenced community, market places and its surroundings.
-) Interview: Interviews were taken with educated as well as layman about the impact of the project. Interviews were selected from the project benefited area as well as neighboring villages.
-) Questionnaire: A questionnaire was developed prior to project visit. The questionnaire was developed in such a way that it covers demography, health and sanitation, agriculture, income, expenditure etc.

2.6 Sources of Collecting Secondary Data

Secondary information has been collected from different sources of governmental and non-governmental organizations such as Ministry of Water Resources (MoWR), Ministry of Finance (MoF), National Planning Commission (NPC), Central Department of Statistics (CBS), Nepal Electricity Authority (NEA), International Center for Integrated Development (ICIMOD), Office of Village Development Committee (VDC). Moreover, secondary data has been employed from other related bulletins, journals, published reports, news and official records.

2.7 Data Processing and Data Analysis

Field questionnaire is carefully checked for possible errors. The data are carefully edited and processed by traditional method i.e. Tally bar, then the required tables are generated by using computer software program. The data are collected through personal interview and presented in suitable tables. They are analyzed and tabulated according to the objective of the study. The method of data analysis is descriptive.

CHAPTER - III

LITERATURE REVIEW

Because of growing importance of hydroelectricity as a source of energy many researcher, writers or scholars have contributed a lot in the field of hydropower. Here an attempt has been made with some studies and findings.

ERAV (2008), the study conducted in Vietnam on “Benefit Sharing from Hydro Power Project” advocates that all people adversely affected by hydro power projects need support in short and long term. This presentation paper highlights the mechanism of benefit sharing by dividing into two sectors Construction phase and another Operation Phase. Compensation and settlement lies under construction phase, for displaced people and resettlement area that is financed by Project Capital Budgets whereas Benefit sharing lies under operation phase that deals about sharing of benefit among all adversely affected groups and communities that host the project in their local and that is financed by Share of Project Revenue.

Indigenous Peoples Assessment and Measures (2010), the study on Divune Subproject at Papua New Guinea, finds out that local communities perceive project as an opportunity for development. Women particularly see the hydro power plant as an opportunity to improve their household facilities as well as provide needed power to make giving birth at the aid post more comfortable. Affected landowners and local leaders have been consulted during the feasibility and preparation of the indigenous peoples plan (IPP). The IPP has been prepared to provide benefits to and enhance participation of affected landowners. In addition to compensation for affected land and assets, the project will provide several project benefits to affected landowners, including

- Subsidized power connection
- Water supply
- Skills training
- Potential employment in subproject.

The issues of land acquisition and compensation are addressed in resettlement plan. The local people perceives hydro projects as local income opportunities, save transport cost to buy kerosene, savings on kerosene costs and opportunity to have access to modern household equipment such as television, refrigerators, and easy mobile phone charging. It not only highlights about the opportunity and positive attitude but also talks about the risk and issues regarding the projects. The issues and risk consists risk of HIV/AIDS infection during Construction, danger of electric fires at home and all night parties, laziness, bad influence from movies.

Garcia (2007), Garcia in his journal article “Hydropower a good alternative for Nepal Challenges and Approaches” has stated that Hydro power project is not created equal. Run-of-river projects with small reservoirs typically have less adverse environmental impact on social, biological and physical environment than large reservoirs that can require the dislocation of people and loss of productive lands and major ecological changes. However, in some cases, larger reservoirs can provide additional benefit such as flood control, irrigation, aqua-culture and recreation/ tourism opportunities. In addition he states that successful implementation of a hydropower project scheme in rural Nepal requires excellent community relations. Local communities recognize that construction of hydropower projects is a ready source of revenues that can be tapped for local projects such as road building, trail improvements, schools, temples, water supplies, rural electrification etc. In some cases, the demands are rational but in some cases they are not.

He suggests that Hydropower development should be structured so that it contributes to local poverty alleviation as well as national benefits. Unfortunately, they have been several instances when early commitments made by project proponents were not carried out. Affected communities are quick to point out the cases of unfulfilled promised and they become a long term irritant that results in conflict between the project proponent and the communities.

Thanju (2007), According to the article, “Kali Gandaki-A Hydroelectric project in Environmental Perspective”, the environmental and social studies department (ESSD) of Nepal electricity authority (NEA) carried out the post construction environments impact study of the project and find that

-) The Kali Gandaki-A project has had positive effect on forest with regard to energy consumption as the use of alternative source of energy has increased.
-) There has been a decrease in average land holding size of the affected families in comparison to pre-project levels.
-) The quality of reconstructed houses appears better than old houses. Some of the new houses are roofed with iron-sheeting and are cemented replacing homes that were previously thatched.
-) The Kali Gandaki primary school for Bote children is operating smoothly with classes up to class 3.
-) The agriculture occupation of affected families has declined by about 5 percentages whereas services category has increases from 6.90 percentage to 9.58 percentage.
-) The intermixing of local and outside labors created both positive and negative effect. Positive effects reported are the exchange of skills, ideas etc. between group. While the negative effects reported are some unacceptable socio-cultural behaviors such as theft and disruption in law and order during the project construction period.
-) The local economy is now more integrated with the national economy because of the project access road and boat transportation on the project reservoirs.
-) 225 people were employed during the operation phase. Local employment in the operation phase is about 69 percentages.
-) 4256 rural house hold have benefited from rural electrification in the project areas.

Cernea (2007) has clarified that the risk of resettlement can be diminished via better demand management. Development knowledge teaches us that measures to reduce risk can be taken both at the project level and the policy level. For instance, policies that keep the cost of energy too low tend to encourage over consumption and tolerate waste, these leading to construction more dams or thermal plants with entailed displacement risks. This suggests that the risk of resettlement can be diminished also through better demand management policies. Ultimately, the interlocked risks inherent in displacement can be controlled when government adopt broad national policies for safety and risk reversals. Single means for instance, cash compensation is insufficient to alone counterbalance all risks. Compensation

needs to be supplemented with special investments directed to the resettled communities and with the resettles apart of the benefits generated by the project that displace them. Without substantial financing, no sound and sustainable resettlement is possible.

Sharma B. M., (2010), has justified that without the participation of the local people, the project can never be succeed. The public, as citizens of a nation and key stakeholders in development have the right to know and to be involved in information exchange and decision making that affected their lives, resources and properties. This is especially important in infrastructure development project such as hydropower development. Furthermore, he adds that a public hearing is both a process of information sharing, discussion and negotiation and an end result of allocating compensation and other impact mitigation activities. Local people i.e. those most directly affected by a hydropower project are key stakeholders. They are at greatest risk, they feel the impact most intensely, they benefited the most from opportunities, and hence they should be the first to be involved. The poor, landless, indigenous nationality and other vulnerable and marginalized people are among these stakeholders but it is they who are often the most difficult get involved. Since local people are key stakeholders over most of the life of hydropower project, their involvement and participation from the beginning is crucial to project success.

Messerschmidt (2008),in his article “An opportunities based approach to mitigating risks associated with infrastructure development project ” mentioned that major infrastructure development projects (hydropower, roads and others) are typically design with great attention to the technical aspects but often with less concern for the inevitable social development and environmental issues. Projects impacts are sometimes considerable and change may be positive or negative. In less developed countries, awareness and appreciation for both the opportunities and the risks involved are often beyond the comprehension of local people. The construction may be greeted, therefore, with high expectation and enthusiasm or with concern, anxiety, suspicion or resistance.

Maldonado (2009), talks about a resettlement approaches for the displaced people of the development project. He claimed that, if a development project is seen as an absolute necessity and is going to take place, we need to consider if displacement is necessary for a project implementation. If displacement is indeed inevitable then a practical resettlement program needs to precede the project. There are two possible resettlement philosophies to

follow, which Michael Cernea described as the property compensation approach versus the people centered development approach. Unfortunately, 86 percentage of projects in his study still focused on the projects compensation approach which uses compensation as the guiding principle for population resettlement. This strategy as described in this study is ineffective and leads to increase impoverishment for those displaced.

There are four components often recognized as the elements needed for a people centered approach that effectively resettles displaced people and improve their livelihood. These components are effective community participation, benefit sharing, political commitment and will for successful resettlement and finally all of these leading to resettlement with development, which is when resettlement is conducted as an opportunity for development for those forcibly displaced. In addition there also needs to be adequate social services to provide consolation and assistance to those affected.

REDP (2001), Rural Energy Development Program considers enhancing the capability of rural communities to plan, implement and manage rural energy system in particular and rural development activities in general on essential vehicle for sustainable development. Emphasis is given to self-governance and genuine participation of local people from planning to successful operation of micro hydro and other rural energy schemes. A comprehensive community mobilization package has been developed by REDP to build social capital to undertake micro hydro scheme and other infrastructure at the community level.

((Ed.),1999), on policy of ministry of power on hydropower development emphasizes, demand for employment in lieu of the land cost, land for land at place of land owners choice, etc. has resulted in contractual problems for several projects. There is therefore a need that project authorities are insulated from the problems arising out of land acquisition and resettlement & rehabilitation(R&R). It will be the responsibility of the state government to acquire the land (government/private/forest) for the project and also negotiate at its own terms with land owners as per the policy adopted by respective state government. Similarly, all the issues of resettlement and rehabilitation associated with project have to be addressed by the state government. The state government may consider forming authorities to address the problem of land acquisition and R & R for all infrastructure projects. In case of Mega project, the project specific authorities may be created not only for land acquisition and RR but for comprehensive development of the area including catchment area project developer

may not be involved in execution and implementation of works by these authorities, but will be required to contribute for funding their plans. All such costs incurred by the developer shall be considered as cost to the project and allowed to be passed through tariffs.

R.Iyer (1998), in his article “Water Projects in Trouble What lessons?” highlights the difficulties of rehabilitation process and criticize the low level of local participation in project implementation. He stated that, in recent year several large dam projects have run into trouble. Further, however good and enlightened the rehabilitation package may be, it does not always in practice. There is not enough land for the “land for the land” principle, the ‘cluster’ approach of keeping communities together is not easy to implement. In many cases, displaced families are pushed into distant areas. There is often an uneasy relationship with the host community in the resettlement areas. There are considerable delays in making compensations payments in giving titles to land and in providing the promised facilities in the rehabilitations areas. It was because of all this that some critics tend to go far to make the general statement that rehabilitation is impossible. We may or may not subscribe to that view but resettlement and rehabilitation in the case of such large projects certainly presents enormous difficulties.

He criticizes that during the project planning and implementation the people affected are generally not consulted nor are information shared with them. The state suffers from an inability to work closely with the people returning to the question of the lesson to be learnt from those experiences, he would recommend that all the necessary studies, surveys, action plans, etc. on the environmental and resettlement/rehabilitation fronts must be completed before a project is approved.

Paranjapye (1994), has notify the dissatisfaction of the people towards the implementation of the policy to distribute the hydroelectricity in the urban areas instead of the local areas. Here he explains about the sustainability of water development when considered within the principle of basin management. Traditional practices respected such principles which have resulted in schemes that have been working since time memorial preliminary analysis shows that the Arun III project will not enhance development needs of the Arun basin. Furthermore, the energy production capacity of the project at 1558 GWH of energy per year is far to excess of energy need of people living in the Sankhuwasabha, Bhojpur or Dhankuta regions in other words, there will be a transfer of benefits from the Arun basin to the Kathmandu Valley via the substations at Duhabi through the 220 KV transmission line. The energy needs

or agricultural needs of 4,50,000 people of this reason cannot be satisfied because in the plan, design for power evacuation, it is simply not meant to do so.

He specified that during the developmental works, the number of household will be displaced, the lands to be acquired for resettling the populations are estimated the implementation of rehabilitation package, the continuing legal and institutional uncertainties are still unknown.

Synghal (1994), has highlighted the fact that the development processes has made the rich more richer and marginalized the poor in his article, "Smaller is better". Development of large scale water resources projects in India has widened the gap between the rich and poor. Instead of bringing about positive changes in the lives of all section of society, these projects have benefited the rich and demoted the poor. He also adds that the management of water resources is a complex process. It should not only deal with storage, diversion and distribution of water but also address the economic, political, social, technological and environmental issues associated with the use of resources.

Similarly, he illustrates the diverse status of the social needs in the context of South Asia. Agricultural, industry and commerce are generally recognized to be the major demands. Family welfare, health, education, social justice, management of common resources and other needs of the community are considered to be secondary. Both these requirements are important and should get equal support. The approach should be to ensure that one is not over emphasized at the cost of the other meeting their demands required the mobilization of both the internal and external resources.

Hence after he surplus that small scale developments projects benefited the people with favorable job opportunity permanently rather than the big projects. To justify the statement he further says that large scale projects generated fewer jobs. The sophisticated nature of the work is capital intensive and even the jobs that are created, during the construction phase are of a temporary nature. When the construction activities cease, this issue is of extreme important as the level of unemployment is high in all countries. Small scale development projects on the other hand offer better alternatives. Such projects though they grow slowly, stimulate development activities at the grass root by generating employment opportunity of a

permanent nature for larger section of society. Unfortunately such a scheme remains starved of political support, investment funds and lack policy commitment.

Bhattarai (1994), points out the various essential outputs of natural resources. Land and water, the two basic element of the landscape are essential for sustaining all forms of lives. Water is needed to bring about qualitative changes in human living as well as for the protection of natural ecosystem. Intervention for water use and development through construction of hydro technical structures (dam/weirs) brings about direct and indirect changes within the local environment of the area where interventions are made. He also declares that the visible positive outcomes of water development are energy, flood control, agro-industrial developments, land use changes and improved access. In many cases, the intervention brings consequences which are adverse and affected the socio economy, settlement, public health, nutrition, recreation and a esthetics of the area within the influence of project. The intervention also leads to modification of geology, leading to accelerated erosion and increased sedimentation, accelerate encroachment on surrounding forest with adverse impact on flora and fauna.

Dixit (1994), has proclaimed that the resettlement and rehabilitation of the displaced people are poorly managed in his article, "Water project in Nepal Lessons from displacement and rehabilitation". He again argued that resettlement and rehabilitation of population affected by water projects have been generally unsatisfactory the world over. In Nepal too, though the affected population has been small, resettlement and rehabilitation of the population affected by water project have been poorly managed. Reforms in planning and management programme to resettle and rehabilitated displaced people are essential to avoid conflict and consequential high-social stress. The study further moves towards the magnitude of the task that are evident from formulation reports of some of the project contemplated to be undertaken. The 10800 MW Karnali-Chisapani projects is estimated to displace about 60000 people and those affected are proposed to be rehabilitated on degraded forest land and Government lands in the lower Karnali basin abutting the Terai. Some non-farm occupations are also proposed to be provided. The cost of the resettlement is estimated at US\$ 108 million. Inclusive of infrastructure, housing and irrigation and farm development (HPC, 1989).

The article also explains about the environmental disruptions and social dislocation even through run-of-river project. Project ancillaries and placement of components like head works, settling tanks, offices and switchyard require space. Acquisition will lead to displacement though the extent is lesser than that in a storage project. The population likely to be affected by run of river project is site specific.

He adds the history that after the independence in India, almost 20 million people are displaced in dams building (Maloney, 1990). In Nepal population displaced by water projects thus far is relatively small. The two major water projects built so far Kulekhani-I and Marshyandii have affected 722 (500+222) families with a population 4772 (3000+1772). The approach for rehabilitation in the two projects range from compensating land for land, land or cash compensation, to only cash compensation. In both the projects, the approach to rehabilitation was unsatisfactory and the social cost has been found to be high. The management of resettlement and rehabilitation in the Marshyandi hydropower which is the run of the hydropower project show that institution in Nepal are still unable to respond to the needs of even a small group of displaced populace. He suggests that certain issues need to be reformed for resettlement and rehabilitation processes, such as process of property acquisition and compensation, related to perception, mechanism for conflict resolution, management of rehabilitation, equity and access to benefits.

Bhadra (2004), has focused that the development of hydropower projects helps in development and modernization of Nepal. Nepal has abundant fresh water, which gives rise to its comparative advantage in hydro-electricity generation and year-round irrigation. This means that irrigation and hydro-electricity can play a leading role in the development process. The common sense idea behind this notation is that both electricity and water can become cheap input in the production process, such as electricity for manufacture of industrial goods and water for irrigation agriculture. It is, therefore, quite difficult to understand why the planners and policy makers in Nepal have largely ignored the hydroelectric potential, the main comparative advantage of Nepal. In general, energy development and in particular hydropower development should therefore, be viewed from the perspective of energy constraints in the economy (i.e. agriculture, industry, tourism, transportation & communication). The provision of rural energy in general and small-scale-electricity in particular does provide a new impetus for sustainable rural development through infusion of modern technology, new skills and higher labor productivity. In addition,

there is also the substitution of imported fossil fuels by renewable energies with benefits accruing to all at the macro level.

Mishra (2000), indicates that the people of the study area (Khaira VDC of Pyuthan) have got project as the base to precede the discussion to fetch the benefit more and more by making dispute in every deeds of the project in his thesis, “A perception on change induced by electrification”. He then explains whatever people have problem like need of drinking water, irrigation, electricity, river training, agriculture, road and transportation all of the people go to project to cope such requirements. As if whatever requirements have people that this is the duty and responsibility of the project that has to be manage in any condition. Despite those sorts of things consequently, the project played the vital role to enhance the mutual relationship by gathering the people in a one platform distinctly.

Hence, the land was acquires to establish the Jhimruk hydroelectric project. Those victims as land acquisition felt harmed of agriculture system and allied in a group. By the project establishment basic infrastructure such as drinking water, electricity and road transportation had been developed. Some people have had this opportunity to use directly and some not. Probably the chance got only few people even among the victims and rest has disadvantaged. And those people also benefited with the development whose land and even other things were not affected. By this mutual relationship have developed and formed a group between have and have not.

He further mentions the change induced by rural electrification project on the study area were easy access of the people to other parts of the country due to the construction of Bhalubang-Pyuthan access road leading to project site from the East-West Highway and electrification of some wards of the VDC. Most other changes were stimulated by the development of these two basic infrastructures. The road also provided access to the district headquarters of Pyuthan by extending upto Khalanga. The study area people perceive rural electrification as one of the remarkable change of the project. VDC has some low land khet which has been irrigated by Jhimruk Khola. As Jhimruk khola is a perennial source of water, the agriculture practice was quite intensive.

CHAPTER - IV

ANALYSIS AND INTERPRETATION OF DATA

This chapter includes the analysis and interpretation of data. For this purpose data are tabulated at first and then analyzed. This chapter is divided into four sub-chapters where the leading part of this chapter covers the details regarding the project as well as socio-economic and environmental impact of Upper Trisuli -3A. Whereas continuing part covers the development of infrastructure. Similarly, ongoing part covers the income source and final part covers people's perception regarding hydropower project.

4.1 Details of the Project

4.1.1 Project Components

Major structures of the proposed project are as follows

Road Access

Only 2.5 km of new road will have to be constructed for the project along with the upgrading of 11.5 km of the road from Betrawati to the headworks site (NEA, 2007). A steel bridge has been built over Trishuli River and a pedestrian bridge will be built near the headworks.

Headworks

The headwork is located about 1 km south of Mailung. The headwork comprises of a 63.0m wide diversion weir with four gates and 39.6 m wide ungated weir in the left bank. A fish ladder cum downstream release channel is provided. The side intake is located in the right bank which will draw 51 cumecs of discharge.

Waterways

The intake channel will have a length of 148.0 m which consists of both open and covered channel. The twin Berri type desanding basin is 95 m long, with each chamber 15 m wide and 9.2 m high. It has been designed to remove suspended sediments of 0.2 mm size and larger. A head pond is provided just after desander. The headrace tunnel will pass mainly through Gneiss rock. The 4.1 km long headrace tunnel will have a finished diameter of 5.4m and shall be lined with shotcrete and concrete support. The headrace tunnel will have two adits,

one at middle stretch and another just before the surge shaft. The restricted orifice surge shaft will be provided at the end of headrace tunnel. The 55° inclined shaft will be 168 m long and will have a diameter of 4.0 m. The 86.5 m long pressure tunnel will have a diameter of 4 m up to the bifurcation and 2 m afterwards. The D shaped tailrace tunnel is 115 m long and has a size of 6.2 m x 5.0 m (NEA, 2007).

Powerhouse

The powerhouse is located in Gneiss rock. The underground powerhouse will have an access tunnel of 100 m length. It will accommodate of two units of vertical shaft Francis turbine generators each of 30 MW installed capacity and its ancillary facilities. The GIS switchyard will be located near the access tunnel portal.

Power Evacuation

A 48 km long 220 kV double circuit transmission line will be built in order to evacuate the power to the proposed substation at Matatirtha. This line will be initially charged at 132 kV. This transmission line is envisaged to evacuate the power of other projects in Upper Trishuli sub basin. Total gross annual energy of 489.76 GWh has been estimated for this study. This value is based on the average monthly flow. The saleable energy is estimated at 460.4 GWh/annum (NEA, 2007).

4.1.2 Environmental Aspects

NEA has carried out detailed Environmental Impact assessment of the project which has been approved by the Ministry of Environment. Upper Trishuli 3 A is a medium sized run of river project with a headwork of 15 m high from existing bed level. All the project structures are in the right bank and most of the structures are of underground nature. Based on the present level of study, the adverse environmental impacts are nominal as only a few households will be affected. This scheme will provide the much needed renewable energy in the present power system which is facing acute shortage of power. The power generation from this project will enhance the macro economic growth and increase income to the government through royalty. It will also have much positive benefits like improvement in local economy, employment opportunities, infrastructure development etc. NEA will be undertaking environmental mitigation plan as per to the recommendation of approved EIA.

4.1.3 Project Cost

The project cost estimate is about 125.18 Million US \$ which excludes VAT and interest during construction. Based on the tender cost, the breakdown is as follows

Item	Million US \$
Civil, Electro-Mechanical & Hydro Mechanical works	89.18
Construction Supervision	3.93
Transmission Line	22.6
Land Acquisition	6.0
Environmental Impact Mitigation	2.0

EPC Contract for major construction work (Civil, E/M & H/M works) signed with China Gezhouba Group Co. Ltd (CGGC) at 89.18 M.\$. Construction supervision by Northwest Hydro Consulting Engineers worth 3.93 M.\$. Contract signed with China Water and Electric Company Ltd. (CWE) for 220 kV Transmission line at 22.6 M.\$. Construction period for transmission line is 30 month. (NEA,2007)

Project financing

This project is being implemented with funds from Nepal government, NEA and concessional loan from China Exim Bank. The US \$120 Million concessional loan from the bank is made available at a rate of 1.75 percentage per annum payable over 15 year period.

Current status of project

Main Project Works

- EPC Contract for major construction work (Civil, E/M & H/M works) signed with China Gezhouba Group Co. Ltd (CGGC) at 89.18 M.\$ on May 2010 (NEA, 2007).
- After effectiveness of loan , CGGC started Construction work from 1st June 2011
- Steel bridge on Trishuli river has been built and access road upgrading is being made
- Temporary camp at headworks has been completed and preparatory work has started for employer camp construction

- Excavation for headworks, desander is being carried out and first stage river diversion will be made in December 2011
- Adit no. 1 excavation has been initiated.

Construction supervision

- Construction supervision by Northwest Hydro Consulting Engineers worth \$3.93 Million and Construction supervision work started since June 1, 2011

Transmission Line Works

- Contract signed with China Water and Electric Company Ltd. (CWE) for 220 kV Transmission line at \$22.6 Million (NEA, 2007).
- Construction period for transmission line is 30 month and detailed alignment survey is being made

4.2 Socio-economic Status

The baseline conditions of the socio-economic and cultural environment have been described into two broad categories namely Highly Affected Families and Less Affected Families. The baseline information of project affected area is compiled from primary data sources.

4.2.1 Education

The literacy rate of Rasuwa and Nuwakot districts are 50.7 percentage and 51.4 percentage respectively. The male and female literacy rates in Rasuwa district are 59.2 percentage and 42.5 percentage correspondingly. Similarly, in Nuwakot district the literacy rate is 62.4 percentage among male and 40.7 percentage among female. The average literacy rate of these districts is 51.5 percentage. The level of education is satisfactory in the project area. There are primary and lower secondary schools in all project impact VDCs. In each VDC, schools are located within 30 minutes to one-hour walk from the settlements. Only half of the respondent is literate in both HAFs & LAFs. 50 percentage in HAF and 48 percentage in LAF are literate.

4.2.2 Number of Family

Family size is average in both areas. 36 percentage of the family has 4 members in HAF and 52 percentage have 3 family members in LAF. Highest number of people in family is 6 which is 10 percentage in HAF and 12 percentage in LAF.

4.2.3 Occupation Distribution

Occupation is the primary source of earning livelihood. People of affected area are engaged in various occupational sectors as shown in presented table.

Table 4.1: Occupation distribution (in Percentage)

Occupation	HAF	LAF
Agriculture	50	12
Labor	8	12
Student	22	42
Abroad	16	25
Local business	4	
Government / Non-government service		8

Source: Field Survey, 2012

Agriculture & livestock is predominant occupation in project area. According to the available data, 50 percentage in HAF and 12 percentage in LAF are involved in agriculture sector and 8 percentage in HAF and 12 percentage in LAF are labours out of the economically active population. Whereas, 16 percentage in HAF and 25 percentage in LAF are in foreign employment. Similarly, 8 percentage are engaged in government services in LAF area. The daily wage rate of the skill and unskilled labour is NRs.300 /- and NRs. 500/- accordingly.

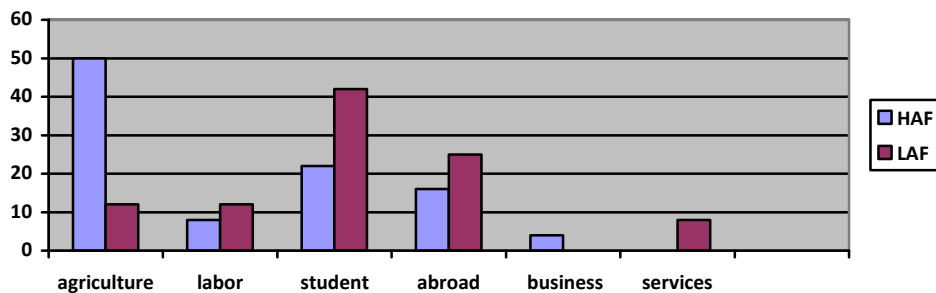


Fig 4.1: Occupation diagram

Figure 4.1 presents that the maximum respondent are engaged in agriculture sector in HAF area whereas maximum respondent are studying in LAF area.

4.2.4 Settlement Pattern

Settlement is the primary infrastructure of every household. The table shows different types of settlement pattern in affected area.

Table 4.2: Settlement Pattern (in Percentage)

House Type	HAF	LAF
Stone mud	87	85
Cemented	13	15

Source: Field Survey, 2012

People of the area live in separate clusters based on their ethnicity and status. Housing patterns are more or less the same throughout the area, irrespective of ethnicity and economic status of the people. Almost all houses are constructed by stone mud. Wood is used for windows and slate, corrugated sheets. Most of the houses are two storied. The ground floor is used for cooking and storage and first floor for bedrooms. A courtyard is found in the front side of most of the houses. The yard is used for various activities such as resting, meeting people, cottage industry work, and for dining. Most households own a smaller house or hut (shed) for cattle, goat and other purposes such as storing dry fodder, firewood or straw.

4.2.5 Local Inhabitant

As per the data collected from the field survey, it was found that more than 85 percentage of the households have lived in the same vicinity for three or more generations. The population is therefore generally stable, growing with a local birth rate and the area has not been subjected to significant migration. However, factors leading to migration of the population from the project affected area are the construction of the road, the lack of social services and other facilities in project area.

4.2.6 School Facilities

School facilities are better in LAF area where 100 percentage respondent give a positive response regarding school facilities, same as 79 percentage in HAF area. In HAF area primary school is access within 30 minutes where as higher school is access more than 30 minute walk only. In LAF area both primary and higher school are easily accessible.

4.3 Infrastructures

4.3.1 Toilet Facilities

Health is primary basic need of every human being. Hencesoafter, affected family wish the improved toilet facilities. The below presented table portyays the present status of the toilet facility of affected area.

Table 4.3: Toilet Facilities(In percentage)

Toilet Facilities	HAF	LAF
Yes	47	68
No	53	32

Source: Field Survey, 2012

Sanitation is one of the indicators of living standard of the people. The above table shows that 53 percentage of family in HAF still use open toilet whereas 32 percentage of family in LAF area also use open toilet.

4.3.2 Drinking Water Resources

As we all know Nepal is rich in water resources. Water is used for various purposes. The table shows the various sources of drinking water resources.

Table 4.4: Drinking Water Resources (in Percentage)

Water Resources	HAF	LAF
Stream	7	12
Piped water	93	88

Source: Field Survey, 2012

The given table shows that the people use river water and piped water for drinking purpose. Almost all area is facilitated with piped water supply in project area. 93 percentage in HAF and 88 percentage in LAF use piped water for drinking water purpose.

4.3.3 Health Facilities

Regarding health facilities both HAF and LAF area are not so satisfactory. There is a health post facilities in both areas that are access more than 30 minute walk. Because of the unavailability of the sufficient health workers and medicine, the available health service is not reliable. The common diseases prevalent are dysentery, diarrhoea, worm infection, gastro intestinal disorders, fever, etc.

4.3.4 Electricity Facilities

Most of the families are already using electricity facility in the project affected area. 74 percentages in HAF and 80 percentages in LAF area are using electricity now. Electricity is used for lighting purpose whereas firewood is the main source of energy cooking. Some of the family use LPG gas and electricity for cooking purpose. 15 percentages in HAF and 10 percentages in LAF are using LPG gas for cooking. The other main purpose of electricity is for study and media access such as computer, TV, Radio, FM.

4.3.5 Road Facilities

There are regular road facilities in the project affected area. There are bus services in HAF but that is not access in rainy seasons whereas after the commencement of project the road situation is improving and expects a regular bus service. On the other side, there is a regular bus services in LAF area. Road of HAF area is dusty and LAF is black topped and graveled.

4.3.6 Market Availability

Local markets are available in both areas. Local market is available within 30 minute walk in LAF areas but all grocery and other required things are unavailable from that market. For other requirements they have to walk more than one hour.

4.3.7 Irrigation Facilities

Irrigation facility is primary and major requirement of advanced agricultural growth. The table illustrates the status of irrigation facility in the affected area.

Table 4.5: Irrigation Facilities (in Percentage)

Irrigation facilities	HAF	LAF
Yes	55	65
No	45	35

Source: Field Survey, 2012

The irrigation facilities in project affected area are not satisfactory. Some of the paddy field has irrigation facilities but are not facilitated whole year and whole area and family. So, that kind of partly irrigation is available 55 percentage family in HAF area and 65 percentage families in LAF area.

4.4. Income Source

4.4.1 Income Source

Income source determine the status of every single family. Here the table demonstrates the current standing of the affected family.

Table 4.6: Income Source (in Percentage)

Income Source	HAF	LAF
Agriculture &livestock	60	63
Daily wages	53	38
Local business	3	17
Salary	7	7
Remittance	22	30

Source: Field Survey, 2012

The income source of the project affected area varies in nature but almost all family depends on the agriculture and livestock. 60 percentage of people's income source is agriculture and livestock in both HAF & LAF area. Not only one income source is in practice in affected area. However, people earn from agriculture product as well as daily wages at the same time. Report shows that about 40 percentage people included daily wages as their income sources.

Similarly, the local business and salary from government and non- government services are the income source of family of affected area.

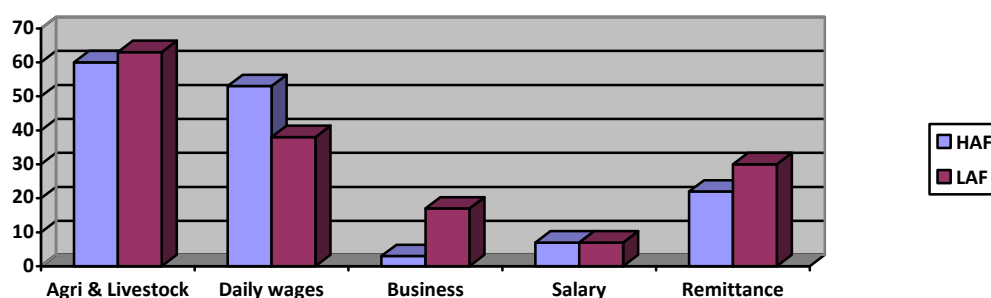


Fig 4.2: Income Source Diagram

The above presented graphed diagram shows that agriculture and livestock is in leading position in both HAF and LAF area regarding income source. Daily wages is in following status whereas remittance is in third rank in regards income source.

4.4.2 Food Sufficiency

Food is the basic need of every living being. The presented table find out the sufficiency of food of every affected family.

Table 4.7: Food Sufficiency (in Percentage)

Food Sufficiency	HAF	LAF
>12 month	8	28
9-12 month	20	17
6-9 month	40	45
<6 month	32	10

Source: Field Survey, 2012

The above table illustrates that 8 percentage of HAF and 28 percentage of LAF people have no any cost for survival, that is to say, they do not suffer from starvation. 20 percentage from HAF and 17 percentage from LAF households observed are able to meet their food requirements from their own agricultural land for a period of 9-12 months in a year. Similarly, 40 percentage families of HAF and 45 percentage family of LAF have enough food for 6-9 months and 32 percentage of HAF and 10 percentage of LAF households have

food for less than 6 months. It is observed that majority of the people are unable to fulfill their food requirement from their own agricultural production.

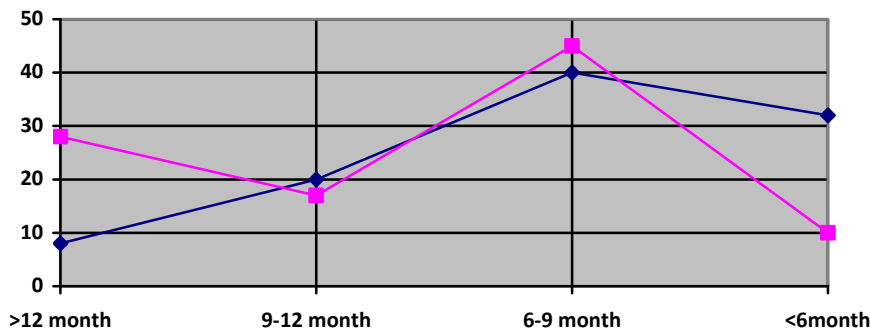


Fig 4.3: Food Sufficiency diagram

As fig 4.3, the blue line represents HAF area whereas pink line represents LAF area. Most of the respondent share the fact that the food produced from their own agricultural product is sufficient for 6-9 months. Whereas, the food sufficiency for more than 12 months is less in both HAF and LAF area.

4.5 People’s Perception from the Project

Every people have their own perception towards the particular thing. Under this sub-chapter, datas are gathered, analyzed and interpreted regarding the people’s perception and expectation towards the Upper Trisuli 3A hydropower project.

4.5.1 Expectation from Project

The following table presents the priority wise expectation regarding the project development. During the field survey, the question asked to the respondent, what they want from project? The respondent report shows they expect good compensation first which is indicate first priority here. Similarly, respondent want a good employment opportunities after good compensation which is indicate second priority here. Similarly, respondents want a free electricity from project which is indicate third priority and they expect a local area development from the project as a fourth priority.

Table 4.8: Expectation from Project (in Percentage)

Expectation from Project	Priority 1		Priority2		Priority3		Priority4	
	HAF	LAF	HAF	LAF	HAF	LAF	HAF	LAF
Good compensation	53	35	24	20	15	20	8	20
Employment opportunity	22	35	35	55	43	10	--	
Electricity	12	20	37	22	45	50	7	8
Development of local area	12	23	7	17	7	35	74	23

Source: Field Survey, 2012

People at project affected area want many infrastructures from project. The major four prior sector are identified and prioritized whereas most of the people priorities good compensation first and then local area development. 53 percentages of HAF people and 35 percentages of LAF people prioritize good compensation at first. 35 percentage of HAF and 55 percentages of LAF people think employment is their second priority. Similarly, people expect development of local area and electricity as a third and less priority sector.

4.5.2 People's satisfaction with Compensated Amount

Most of respondent are satisfied with the received compensated amount. People got compensation in term of money in return of their fertile land and that amount goes to the non-productive sector which may invite a production deficit.

Table 4.9: Satisfaction with compensation (in Percentage)

Satisfied	HAF	LAF
Yes	88	75
No	12	25

Source: Field Survey, 2012

Present table shows that 88 percentage respondent from highly affected family area and 75 percentage respondent from less affected family area are satisfied with the compensation amount provided by the project where as 12 percentage people from HAF and 25 percentage from LAF area are not satisfied with the amount compensated.

4.5.3 Use of Compensated Amount

While the process of project development, project compensate to the locals for the land acquisition. They compensate to the highly productive land and barren land accordingly. Project not only acquisite the land, it also enters into long term lease as well as short term lease. The locals receive compensation in terms of money in return of their land and use that amount in various sectors such as purchasing land, investing, building home, depositing in banks. But we can say that most of the compensated amount went to the non-productive field. HAF area people received more compensation amount as they loss more. 18 percentage of HAF and 50 percentage of LAF brought a land at same area or different place. 37 percentage of HAF and 17 percentage of LAF built or renovate a home. 30 percentage from HAF and 20 percentage from LAF use their compensated amount in local investment such as to establish local shop, poultry farm, brought a vehicle etc. 14 percentage family use that amount as bank deposit and local debt.

4.5.4 Improvement in Education Sector

Education is basic requirement. With the development of this project people expect improvement in education sector. The table below shows the focus wise improvement in educational field.

Table 4.10: Improvement in Education Sector (in Percentage)

Improvement in Education Sector	HAF	LAF
New construction	5	0
Addition of staff	42	53
Renovate	53	47

Source: Field Survey, 2012

There is a school facility in the both HAF and LAF areas. So, least respondent expect new construction of school. Otherwise, people expect the additional staff and renovate of school. 42 percentage of HAF and 53 percentage of LAF expect an additional staff in a school. Similarly, 53 percentage from HAF and 47 percentage from LAF want the renovation of school.

4.5.5 Skilled Manpower

Skilled manpower is the basic source of generating income. Hence, the table presents the status of the people in the affected area whether they are skilled or unskilled.

Table 4.11: Skilled Manpower (in Percentage)

Skilled Manpower	HAF	LAF
Yes	43	70
No	57	30

Source: Field Survey, 2012

Both the HAF and LAF have a majority of unskilled labor. Even who have a skill they are not technical and efficient skill. Most of local has a driving skill. Some of them have computer skill.

4.5.6 Expected Job Facilities

To generate income people should engage in certain field. With the development of this project people expect better job facility. Here the table presents the various sectors to generate income.

Table 4.12: Expected Job Facilities (in Percentage)

Expected Job Facilities	HAF	LAF
Labour	31	33
Security	35	23
Official	3	8
Technical	8	0
Driving	11	10
Other	15	27

Source: Field Survey, 2012

As most of the active age people in locality are unskilled, they expect the unskilled type of job from the project. In the both construction phase and after project start the people expect the labor type job from project. Both HAF area and LAF area people want a labor, security and driving job from project. 31 percentage from HAF and 33 percentage from LAF want labor job, 35 percentage from HAF and 23 percentage LAF expect a security job, similarly, 11 percentage from HAF and 10 percentage LAF expect a driving job from the project.

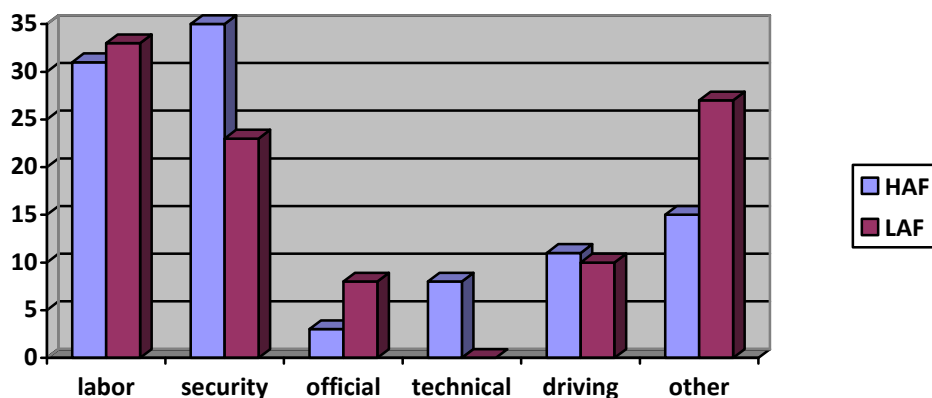


Fig 4.4: Expected Job Facility Diagram

The above diagram portrays that the respondent expect labor and security job at highest level in both HAF and LAF area.

4.5.7 Expected Skill Job and Skill Manpower

Table 4.13: expected skill job and skill manpower (in percentage)

Detail	HAF	LAF
Skill manpower	43	70
Expected skill job	22	18

Source: Field survey, 2012

Table 4.13 shows the difference between available skill man power in concern area and job expectation from the project. However, skill manpower which include technician, electrician, driving are 43 percent in HAF area and 70 percent in LAF area but only 22 percent from HAF and 18 percent from LAF are expected skill job.

4.5.8 Expected Electricity

Electricity is basic requirement for day-to-day existence. People expect free electricity or minimum cost of electricity after the establishment of this project.

Table 4.14: Expected Electricity (in Percentage)

Expected Electricity	HAF	LAF
Free	85	87
Minimum cost	12	13
Free for some year then minimum cost	3	0

Source: Field Survey, 2012

Affected area is facilitated from electricity. Even though, some families are not using electricity facilities because of monthly expense. After this project they perceive that they must have free electricity. 85 percentage peoples from HAF area and 87 percentage from LAF area expect free electricity after the project. 12 percentage from HAF and 13 percentage from LAF expect electricity at a minimum cost.

4.5.9 Affected and Expectation of Drinking Water Resource

The below table presents the fact that whether the development of this project has affected the drinking water resources or not and people's expectation of water resource in project area.

Table 4.15: Affected and Expectation of drinking Water Resources (in Percentage)

Detail	HAF		LAF	
Affected/Non Affected	28	72	10	90
New Source	52		35	
Maintenance		48		65

Source: Field survey, 2012

After the project commence, project activities affect the local drinking water source. There is very less resident around main project tunnel and power house, hence after it does not affect much the water source. Only 28 percentage in HAF and 10 percentage in LAF says a project affect the drinking water source. The above table shows that the development of project does not affect much in water resources. But the local of affected area expect improvement in the existing water resources. As we found water source not affected more in project area affected family expect maintenance of exiting water source, 48 percentage of HAF and 65 percentage of LAF want maintenance of exiting water source. 52 percentage of HAF expect a new tap from the project where main infrastructures are going to build. As well as 35 percentage from LAF wants new source of water.

4.5.10 Expected Improvement in Irrigation

Project affects the irrigation process in the project area. As irrigation facilities is not satisfactory even though whatever small-scale canal was in practices in project area are disturbance somehow by project. Some of irrigation practices are damaged by main project tunnel and power house. On the other hand some irrigation cannels are out of order due to the improvement and extension of connection road facilities. Hence, most of the respondent expect the improved irrigation facilities via new construction and maintenance.

4.5.11 Expected Improvement in Road Facilities

The table presented below shows that the road is not facilitated much. Hence, the affected people expect improved road facilities in affected area.

Table 4.16: Expected Improvement in Road Facilities (in Percentage)

Expected Improvement in Road Facilities	HAF	LAF
Black topped	87	32
Gravel	0	0
Extention	13	68

Source: Field Survey, 2012

In highly affected project area road facilities is improving but that is dust road. So, HAF areas people expect a black topped road facilities from the project. Similarly, some people expect extension of road also. 87 percentage from HAF expect a black topped road where as 32 percentage from LAF expect black topped. 13 percentage from HAF and 68 percentage from LAF want extension of road facilities.

4.5.12 Expected Health Facilities

As we all know Health is Wealth. Hence, the affected family expect the improved health facilities.

Table 4.17: Expected Health Facilities (in Percentage)

Expected Health Facilities	HAF	LAF
New construction	30	60
Addition of staff	70	40

Source: Field Survey, 2012

As a health facility on project areas are not good, the people expect a better facilitate health service nearby them. After the project, 30 percentage people from HAF and 60 percentage LAF area, they expect a new construction of health related office. On the next side, 70 percentage of HAF and 40 percentage of LAF family expect additional new staff and equipment at exiting health post.

4.5.13 Industrial Development

The respondent reported that there is not any establishment of small or big indusry before or after the commencement of this project.

4.5.14 Impact of Projects and Mitigation

During field survey most of the respondent mention that the affect of the forest by the hydropower project is negligible. Where as chances of landslide increases after project.

People's movement, transportation, money transation ratio and follow, market activities are the positive effect after the commencement of the project. On the contrary, loss of fertile land, chances of landslide, noise pollution, disorder of law and regulation are the negative effect of the project.

4.5.15 Conflict to Upgrade the Plant Capacity from 60MW to 90MW

Under this sub-chapter, it is analyzed that there are complexities to upgrade the plant capacity of Upper-Trisuli 3A project. Here are some discussed facts regarding for and against the proposed proposal.

China Gezhouba Group Company Limited (CGGC) has made a proposal to upgrade the plant capacity of existing project from 60 MW to 90 MW on 25 March 2011 and the cost proposed is 133.767 Million US\$. CGGC has made the proposal for augmentation that has been forwarded on 15 Dec 2009, June 2010 and on Jan 2012 (NEA, 2012).

On 16 June 2010, NEA has rejected the exceptional proposal of CGGC, that is to upgrade the capacity. The review study conducted under the guidance of the manager of NEA, Mr. Mohan Ratna Shakya, has concluded that the proposed proposal on 13 June 2011 would extend the construction time of 3 months extra and will cost 4 Million US\$ extra. (NEA, 2011). Another review study conducted under the presence of director of NEA, Mr. Subash Dahal, has concluded that the proposal proposed by CGGC will extend the time of construction and the cost will also maximize. Because of the legal complexitites, additional economical resources, extensive review of technical sector regarding the contruction contract lead to the rejection of upgrading the capacity of Upper Trisuli 3A Hydropower project (NEA, 2012).

To the contrary, the meeting held on 31 May 2013 by NEA's board of director, approved the proposal and reach to the conclusion to upgrade the plant capacity from 60 MW to 90 MW (Thapa, 2013). On Jan 2013, the government of Dr. Baburam Bhattarai has approved the proposal to upgrade the capacity. The decision based on the fact that the plant capacity of 90 MW will be able to run at full load for 6 months that will certainly benefit the customer and the country which is currently suffereing from a huge power deficit.

According to CGGC, the economic efficiencies to upgrade the plant capacity are

CGGC report concluded that after upgrade the plant 60 MW to 90 MW Nepal power system will have 30 MW of installed capacity added with additional 12 months. After augmentation

to 90 MW, total of about 148GWh of additional energy will be available for the system annually. Similarly, in the existing project of 60 MW there is a huge wastage of essential water during April till December. The same can be harnessed very effectively provided that the plant is upgraded to 90 MW. CGGC also emphasizes that after upgrading the existing capacity of Upper Trisuli 3A project to 90 MW, the existing 2 sets of generating units will become 3, this will increase the tail water discharge and enhance the downstream capacity of Upper Trisuli 3B from 37 MW to 55MW. CGGC report also highlights the reason to upgrade the plant in the term of time as current socio-economic situation of Nepal, we have experienced that any independent project of 30 MW will take around 5-6 years to generate and transmit power. The additional 30 MW under discussion can be generated within period of additional 12 months.

CGGC again try to prove the importance of upgrading the project in term of cost as well. The contract price for 60 MW capacity is US\$ 89.19 million and the price offered by CGGC for the total capacity enhancement to 90 MW is US\$ 133.767 million. The additional 30 MW will be developed at a price much lower than what will be required for an independent project of the same capacity (NEA, 2012).

The review committee held by NEA has rejected the proposal to upgrade because of the following reason

NEA made a review committee in different time after CGGC proposed to upgrade a plant but they reject the proposal to upgrade plant. The review committee reject the upgrading plan because it needs a review the technical design of the project again. While upgrading additional 30 MW, the excessive amount of US\$ 44.59 million amount should be arranged either from government of China under the concessional loan agreement or from the government of Nepal. To upgrade the additional 30 MW, it will take extra 12 months (NEA, 2011).

New DPR should be prepared while upgrading the project. It extend the time of construction and the cost will also maximize. Because of the legal complexities, additional economical resources, extensive review of technical sector regarding the construction contract lead to the rejection of upgrading the capacity of Upper Trisuli 3A Hydropower project (NEA, 2012).

Nepal government is forced to take back its decision regarding the upgrading of the plant capacity and concludes that 60 MW is best option because of the rejection via intellectual sector, related expert, professionals and local people. Henceafter, NEA executive board cancelled the proposal of upgrading the project on June 13, 2013.

CHAPTER - V

MAJOR FINDINGS, CONCLUSION AND RECOMMENDATION

This chapter sums up the findings and conclusions of the development of Hydropower Project. An overall assessment is provided first, followed by sections giving specific conclusions and recommendations.

5.1 Major Findings

My primary interviews and surveys pointed to the fact that electricity and development were what the local people have been wanting and looking for, and this hydropower project has seemingly fulfilled both of these needs. This has been done through providing constant reliably electricity and the ability to use electrical appliances because of the load shedding. Even though local people made comments about environmental degradation, loss of pasturelands and living areas and still having to be energy reliant. Many still seemed to be weighing the positives and negatives and have come to the conclusion that this Hydropower project has satisfied them. Even people, who saw no benefits from the hydropower project, were still in favor of it because of the overall benefits to their family, friends and others. Hydropower has the ability to become a major contributor to affected area and whole Nepal's energy system that will simultaneously offer a supply of renewable energy and an ability to have a more secure and stable source of freshwater. Hydropower both small and large projects have the ability of generating relatively clean and renewable energy resource for these people living in areas. This research has also changed my overall outlook about hydropower for the rural areas who struggle to create renewable energy resources and are also in a situation where freshwater security is paramount and extremely important to overall national security.

This is a descriptive study designed to find out the peoples perception and socio-economic and environmental impact of upper Trisuli 3-A hydropower project at Rasuwa and Nuwakot district. For this purposes different chapters are included in the study. First chapter includes background, statement of problem objective of the study significance of the study and limitation of the study. Chapter two includes nature of data, sample selection questionnaire design, method of data collection, data processing and data analysis in methodology Chapter three includes the literature review. Chapter four includes analysis and interpretation of data and at last chapter five includes summary, conclusion and recommendations.

This study conducted from the direct interview method among 100(60 HAF & 40 LAF) respondents. Those respondents were selected by random selection. The major summary findings of the study area pointed as follows

- J Proportion of literate respondent is found highest (i.e. 50 percentage HAF & 48 percentage LAF) in study area.
- J The highest proportion of respondent's has 4 member in family(i.e. 36 percentage) . The lowest portion of has 6 member in family(i.e 10 percentage)
- J The highest proportion of respondents (i.e. 50 percentage) predominant occupation is agriculture and livestock.
- J The maximum percentage of respondents (i.e.87 percentage HAF & 85 percentage LAF) reported the housing pattern is stone mud.
- J The highest percentage of respondents (i.e. 100 percentage LAF &79 percentage HAF) give a positive response regarding school facilities.
- J 53 percentage in HAF and 32 percentage percent respondents reported that they are still using open toilet.
- J The highest proportion of respondent (i.e.93 percentage HAF& 88 percentage LAF) reported they are using piped water for drinking water purpose.
- J The highest percentages of respondent are not satisfactory with health facilities. The highest proportion of respondent (i.e 74 percentage HAF & 80 percentage LAF) already using electricity facilities.
- J There are regular road services in both highly affected family area and less affected family area.
- J The highest proportion of respondent (i.e 60 percentage) depends on the agriculture and livestock income.
- J 55 percentage HAF & 65 percentage LAF respondents reported they have partly irrigated land for farming.

-) Only 8 percentage HAF and 28 percentage LAF fulfill their food requirement from their own agricultural production.
-) The highest proportion of respondent from both area prioritized the good compensation, employment opportunity, electricity and local area development as four major prior sector.
-) The highest percentage of respondent (i.e 88 percentage HAF & 75 percentage LAF) is satisfied with the compensated amount.
-) Most of respondent use compensated amount purchasing land, investing, building home, depositing in bank.
-) 53 percentage respondent from HAF want a renovate of school and 53 percentage respondent from LAF want additional staff from project.
-) As both the HAF And LAF have a majority of unskilled labor, they expect the unskilled type of job from the project.
-) The highest proportion of respondents (i.e 85 percentage HAF & 87 percentage LAF) expects a free electricity from project.
-) Most of the respondent (i.e. 72 percentage HAF & 90 percentage LAF) reported the hydropower project doesn't affect the drinking water resource. That's why they expect maintenance of existing source.
-) As irrigation facilities are not satisfactory at project affected area they expect a new irrigation project from hydropower project.
-) As most of people are not satisfy with health service 60 percentage respondents perceive a new construction of health facilities at HAF area whereas 70 percentage respondent perceive additional staff at LAF from project.

5.2 Conclusions

In terms of the loss of land and assets, 250 Households will be affected due to the implementation of the project. None of the families are seriously project affected and relocates. About 20 ha of agricultural land will be affected by the project, suggesting that there will be a loss of some yield from permanently acquired land.

-) The conclusion of the study area as follows:
-) Only 50 percentage of people are literate at project affect districts.
-) Still agriculture and livestock is main occupation in rural area.
-) Sanitation situation in rural area is still not satisfactory as still many family using open toilet.
-) There is satisfactory condition in drinking water.
-) Health facilities is not satisfactory at rural area.
-) Most of the families are already using electricity facility in the project affected family.
-) After implementation of project road facilities and market availability are improve.
-) In rural areas, farming and keeping livestock is main occupation but the respondents have not able to meet their annual food needs by that occupation.
-) There is not irrigation facility in study area.
-) The origin of drinking water is in difference places. So the project has not affected in drinking water.
-) Good compensation, employment opportunity, electricity and local area development are the major people's expectation from project.
-) As most of the active people in locality are unskilled, they expect the unskilled type job from project.

-) People expect the renovate and addition of staff in school sector and health service sector.
-) People perceive a free electricity facility after project.
-) Affected people expects maintenance of exiting water source and new construction of irrigation facilities.

5.3 Recommendations

Project proponent should acquire the land before the construction of project with reasonable and fair compensation for affected families for their loss of property, existing livelihood and other.

-) Project proponent should provide adequate compensation for loss and disturbance of land and other properties, compensation for the injured livestock, loss of crops, loss of trees, etc.
-) Project proponent and construction contractors should implement health related programmes, both through the existing health agencies like health post as well as the health camp or project managed health centre. These programmes could come largely in the form of health related extension and education measures.
-) Strong code of conduct should be developed and maintained by the project proponent and contractors to maintain the law and order situation and to avoid the conflict between the local people and construction workers.
-) To avoid the undue encroachment by the construction workers at the historically and culturally important places, the construction contractors and the project proponent should give sufficient training for their workers and maintain the required legal system.
-) Strong code of conduct should be maintained to preserve the socio-culture and to avoid the disturbance from construction workers.
-) A detailed Acquisition, Compensation and Rehabilitation Plan is required at the Detailed Design stage for a number of reasons, but primarily because the project configuration and engineering parameters may be changed or adjusted during Detailed Design, such as the selection of construction techniques and construction schedules.

REFERENCES

- Bhadra, B. (2004). Hydropower Development in Nepal. In M. K. ed., *Nepalese Economy, Toward building a strong economic nation-state*. Kathmandu, Nepal: Central department of economics at Tribhuvan University, Kritipur.
- Bhattarai, T. N. (1994). Environmental Impact Assessment in Water Resources Development in Nepal. *Water Nepal, Vol. 4, No. 1*, 50-55.
- Cernea, M. M. (2007). IRR: An operational risks reduction model for population resettlement. *Hydro Nepal. Vol 1, Issue 1*.
- Dixit, A. (1994). Water project in Nepal: Lessons from displacement and rehabilitation. *Water Nepal. Vol. 4, No.1*.
- ERAV. (2008). *Benefit Sharing from Hydropower projects in Vietnam*. Vietnam: Electricity Regulatory Authority of Vietnam.
- Garcia, J. C. (June 2007). Hydropower, A Good Alternative for Nepal: Challenges and Approaches. *Hydro Nepal, Vol.1, Issue No.1*.
- Inger-Mari. (1987). A Conceptual Framework for Analysis of the Socio-Economic ND. *Mountain Research and Development, Vol. 7, No. 3*, pp 205-208.
- Maldonado, J. K. (2009). Putting a price-tag on humanity development- forced displaced communities, fight for more than just compensation. *Hydo Nepal. Issue no.4*.
- Messerschmidt, D. (2008). An opportunities based approach to mitigating risks associated with infrastructure development projects. *Hydro Nepal. Issue no.3*.
- Mishra, K. R. (2000). *A Perception on Change Induced by Electrification*. Department of Sociology And Anthropology, Kathmandu.
- MOF. (2009/10). *Economic Survey*. Retrieved 2012, from www.mof.gov.np.
- MOF. (2011/12). *Economic Survey*. Retrieved 2012, from www.investnepal.gov.np.
- NEA. (2005/06). *A Year in Review*. Retrieved 2012, from www.nea.org.np.
- NEA. (2007). DPR Study of Upper Trisuli 3A Hydropower Project.
- NEA. (2011). Report of Upgrade plant capacity option for Upper Trisuli 3A Hydroelectric Project.
- NEA. (2012). Report of Upgrade plant capacity option for Upper Trisuli 3A Hydroelectric Project.
- Nepal Electricity Authority, N. (June 2011). *Upper Trisuli 3A Hydroelectric Project*. NEA.

- Paranjapye, V. (1994). Preliminary Look at Arun III in light of Tehri experience. *Water Nepal, Vol. 4, No.1*, 30-35.
- Pun, S. B. (2008). Praguay,Bhutan and Nepal: Landlocked but hydropower rich case of the lame duck, flying goose and Sitting duck. *Hydro Nepal. Issue no.1*.
- R. Iyer, R. S. (1998). Water Projects in Trouble: What Lesson? *Water Nepal, Vol. 6, No. 1*.
- REDP. (2001). *Micro Hydro Implementation Guidelines: Rural Energy Development Program*. REDP Publication.
- S.A. (1999). (Ed.), Policy of Hydropower Development as announced by Ministry of Power. In *Small Hydropower*.
- Sharma, B. M. (2010). Public hearing in the EIA process of hydropower development. *Hydro Nepal. Issue no.7*.
- Skinner, J., Niase, M. and Haas,L.(eds.). (2009). Sharing the benefit of large dams in West Africa. *Natural Resource Issue19,International Institute for Environment and Development.London, UK*.
- Synghal, S. (1994). Smaller is Better. *Water Nepal, Vol. 4, No. 1*, 40-45.
- Thanju, R. P. (2007). kali Gandaki 'A' Hydroelectric project in enviromental perspectives. *hydro Nepal, Vol 1, Issue 1*.
- Thapa, A. (2008). Dams. enviornment and local people. *Hydro Nepal. Issue no.2*.
- Thapa, H. B. (2013, june 09). *Ekantipur.com.np*. Retrieved December 2013
- (1999). Policy on Hydropower Development as announced by Ministry of Power, 1998. In S. A. Sharma (Ed.), *Small Hydropower (II Ed.)*. University of Rookee, India.
- (2010). *Indigenous Peoples Assessment and Measures*. Papua New Guinea: Project Number: 41504.

ANEXX

Aneex-1 Questionnaire

The Perception and Attitude of the People Towards Upper-Trisuli-3 A Hydropower Project

A Thesis Study Household Survey Questionnaire

A. General Information

A.1. Name of head of the household
Address

A.2. Name of the respondent
Gender

Age
Education

*Education- a) Literate. b) School attends. c) SLC. d) Higher Education.

A.3. Family Information

SN	Name	Relation with Head of HH	Gender	Age	Education	Occupation	Remarks

*Education- a) Literate. b) School attends. c) SLC. d) Higher Education.

Occupation- a) Agriculture. b) Gov. Services. C) Non-gov. services. d) Labor. e) Student. f) Other

A.4. Since how long your family has been residing here?

- a) Local inhabitants
- b) Migrated

* Migrated- a) last year b) 5 years ago c) More than 5 years

A.5. What is the cause of the migration?

- a) Better facility access
- b) Employment opportunities
- c) High agricultural production
- d) Other

A.6. Housing Condition

- a) Stone-mud house
- b) Cemented
- c) Hut

B. Socio-economic status

B.1. Education

B.1.1. Do you have school facility in your locality?

- a) Yes
- b) No

B.1.2. If yes, up to which level?

B.1.3. If no, how far is it from your locality?

B.2. Health and Sanitation

B.2.1. Do you have toilet facility?

- a) Yes
- b) No

B.2.2. What types of water sources is there in your home?

- a) Stream
- b) River
- c) Piped water
- d) Tube Well
- e) Other

B.2.3. Is there any health post near this village?

- a) Yes
- b) No

B.2.3.1. Is yes then how far is it from your home?

- a) 0-5 km
- b) 5km +

B.3. Energy

B.3.1. Is electricity available in your home?

- a) Yes
- b) No

B.3.2. If not available do you want electricity in your home?

- a) Yes
- b) No

B.3.3. If electricity is available in your home in what purpose you will use?

- a) Light
- b) Cooking
- c) Industry
- d) Study
- e) Others

B.3.4. Use of energy

Types of energy	Purpose
Firewood	
Kerosene	
Biogas	
Electricity	

C. Transportation

C.1. Do you have roads connected to highway?

- a) Yes
- b) No

C.2. If yes, when was it built?

C.3. Do you have regular bus services from your village?

- a) Yes
- b) No

C.4. What types of road is there

- a) Black topped
- b) Grable
- c) Dust road

C.5. How far is your market for grocery purpose?

D. Income

D.1. Enlist your previous year income and income sources

S.N	Description	Annual income (Rs)	Remarks
1	Agriculture		
1.1	Cereals		
1.2	Cash crops		
1.3	Fruits		
2	Livestock		
3.	Other sources		
A	Service		
B	Labour, daily wage		
C	Pension		
D	Foreign employment		
E	Business/ enterprise		
F	Cottage industry		
G	Professional service		
H	Fish killing		
I	Others		
	Total		

D.2. Mention your land in ropani

Ownership	Low land	Upland	Kharbari	Remarks
Owned				
Rented in				
Rented out				
Total				

D.3. Is there irrigation in your farm?

- a) Yes
- b) No

D.4. Food sufficiency from the agriculture land

- a) More than 12 months
- b) 9 to 12 months
- c) 6 to 9 months
- d) Less than 6 months

D.5. If your own production is deficit then how will you feed to your family?

- a) Daily wages
- b) Pension
- c) Loans
- d) Carrying others goods
- e) Selling house goods
- f) Remittance income
- g) Others

E. Perception

E.1. Do you have any information about the Upper Trishuli-3A hydropower project?

- | | |
|----|-----|
| a) | Yes |
| b) | No |

E.2. How do you come to know about this project?

- | | |
|----|------------------|
| a) | Media |
| b) | Local leaders |
| c) | Villagers |
| d) | Family guardians |
| e) | Others |

E.3. If yes what do you want from this project?

- a) Receiving of good land compensation
- b) Employment opportunity
- c) Achieving of electricity facility
- d) Development of local area
- e) Others

E.3.1. Compensation

E.3.1.1 Give the description of your affected land due to the implementation of the project?

S.N	Plot No.	Name of the place	V.D.C (Ward No.)	Area (Ropani)
1				
2				
3				
4				
5				

E.3.1.2. What do you receive in place of land/house compensation?

- a. Cash
- b. Land for land
- c. House for house
- d. Others

E.3.1.3. What did you do with that compensated amount?

- a) Bought land
- b) Built home
- c) Invest/Deposited
- d) Others

E.3.1.4. Are you satisfied with the compensation granted?

- a) Yes
- b) No

E.3.2. Employment Opportunities

E.2.1.1 Do you possess any skills/ training?

E.2.1.2 In which level are you studying?

E.2.1.3 Which type of job are you expecting from this project?

E.3.1 Electricity facility

E.3.1.1 What sort of electricity related facilities are you expecting from this project?

- a) Free
- b) Minimum cost
- c) Free for some year and minimum from then

E.4.1. Development of local area

E.4.1.1 Do you think that the project has affected the drinking water sources?

- a) Yes
- b) No

E.4.1.2 If yes, had they promised to restore the water sources in right condition?

- a) Yes
- b) No

E.4.1.3 What types of drinking water facility are you expecting from the project?

- a) New tap
- b) New sources of water
- c) Maintenance of existing water sources

E.4.1.4 Have you recognized that the project had hampered the irrigation procedure and development?

- a) Yes
- b) No

E.4.1.5 If yes, then had they talked about the improvement in the situation?

- a) Yes
- b) No

E.4.1.6 What types of irrigation facility are you expecting from the project?

- a) New irrigation project
- b) Maintenance of channel

E.4.1.7 What types of health facilities do you want from the project?

- a) New construction
- b) Addition of Staff
- c) Renovate

E.4.1.8 What types of educational support/school expects from projects?

- a) New construction
- b) Addition of Staff
- c) Renovate

E.4.1.9 What types of improvement of road facilities expect from project?

- a) Black topped
- b) Gravel
- c) Extension

E.4.1.10 Have you known about the establishment of small or large scale industries after the construction phase of this project?

- a) Yes
- b) No

F. Impact of projects and mitigation

F.1 What do you think does the forest has been affected by this project?

F.2 Has the natural disaster occurred because of this project?

a) Landslide b) Flood c) Soil erosion d) Deforestation

F.3 Does the project has made any changes?