ASSESSING THE ROLE OF LAND TENURE IN HYDROPOWER DEVELOPMENT FOR SOCIAL AND ENVIRONMENTAL EFFECTS

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February, 2011

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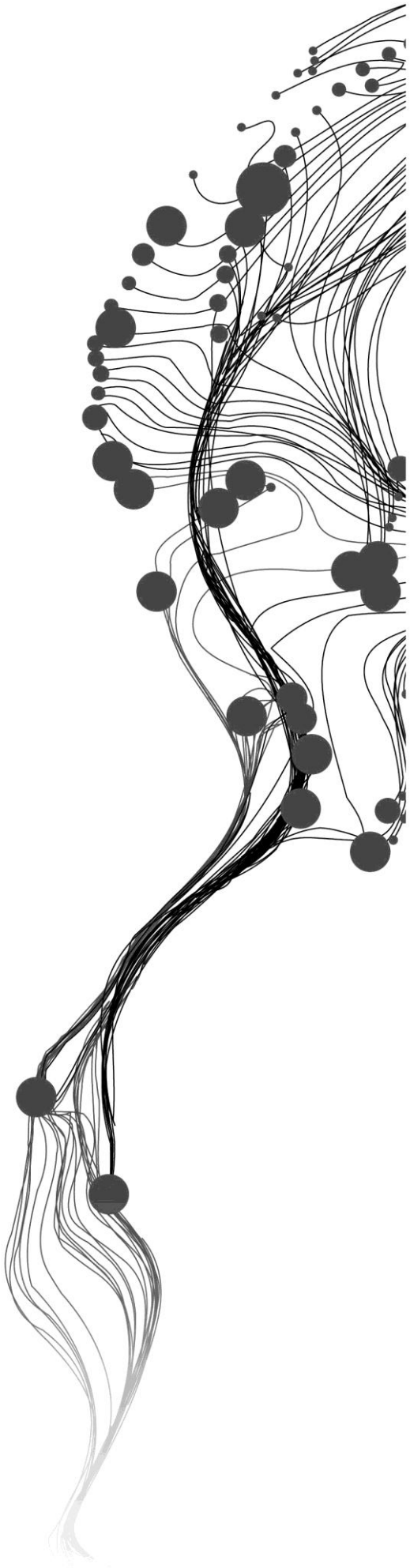

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SUBASH GHIMIRE
Enschede, The Netherlands, February, 2011

Thesis submitted to the Faculty of Geo-Information Science and Earth Observation of the University of Twente in partial fulfilment of the requirements for the degree of Master of Science in Geo-information Science and Earth Observation.
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ABSTRACT

In many developing countries hydropower projects are not sustainable. Tenure issues such as tenure forms and its allocation, land acquisition procedure, land tenure stakeholders and their role are not considered in a hydropower development plan. Affected people cannot expect better livelihood from unsustainable development of any hydropower projects. This research aims to assess the role of land tenure in hydropower development for social and environmental effects.

Desk research indicates that political decision making, planning and feasibility study, implementation and operation are key stages in hydropower development project. In order to assess the role of land tenure, an assessment framework is firstly developed within the scope of these stages. The primary and secondary data were collected in a case study site at the Upper Tamakoshi Hydroelectric Project (UTHEP) in Dolakha district of Nepal. Household questionnaire, key informants' interviews and field observation were conducted to collect primary data while the relevant documents such as detailed feasibility report, property valuation report and spatial data (cadastral data, image etc.) were also collected for the study.

This research also reveals that the concession with broader negotiations and agreements is carried out for interfering the land rights for the construction of hydropower project in Norway because of which the Aurland hydropower project got successful while the UTHEP applies directly compulsory purchase to acquire land. Based on interview with Village Development Committee (VDC) heads, the coordination among the stakeholders is weak in the UTHEP which results in duplication of activities. After analysing data, it is found that social effect includes influx of workers in host communities in the project area which creates mix in culture between them promoting social unrest and disputes. The result also reveals that land conflicts such as low valuation, unfair compensation and non-timely compensation existed during land acquisition for the project. The results from secondary data and interviews confirm that UTHEP has planned to distribute 10% share to the residents of Dolakha district to promote local level investment. The result also indicates that livelihood of the people in the project area is becoming better day by day because of access to road, employment etc. Regarding the environmental effects, the result shows that there is loss of vegetation and trees by the project. Land use pattern is changed from agricultural land to built up area having project features. The disturbance in ecosystem and reduction of population, habitat and biodiversity of species are increased because of the project development. The landslides occur by the use of heavy equipment in construction activities. An assessment result indicates that overall environmental impacts are limited because of technological development such as tunnel and underground powerhouse in UTHEP.

Finally, this research finds that concessions with broader negotiations, agreements and sharing of benefits should be carried out for sustainable project development. The comprehensive land use planning is to be prepared for hydropower development. The compulsory purchase of land is to be carried out with participation of affected people for sustainable development of the project. Governance principle should be maintained in all stages of hydropower development. The stakeholders' expectation/claim and interest should be considered during development and their role should be properly defined to avoid duplications. Land tenure has very important role in hydropower development for minimising negative social and environmental effects and should be focused in all stages of hydropower development to avoid cost and time overrun of the project.

Keywords: *Land tenure, Hydropower development, Land conflict, Sustainable development, Society and Environment.*

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Subash Ghimire
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TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDIX

LIST OF ABBREVIATIONS

ACRP:	Acquisition, Compensation and Rehabilitation Plan
CAD:	Computer Aided Design
CDO:	Chief District Officer
CFC:	Compensation Fixing Committee
CIT:	Citizen Investment Trust
DDC:	District Development Committee
DOA:	Department of Agriculture
DOED:	Department of Electricity Department
DOF:	Department of Forest
DoS:	Department of Survey or Survey Department
EIA:	Environment Impact Assessment
FAO:	Food and Agriculture Organization
FIG:	International Federation of Surveyors
GoN:	Government of Nepal
Ha:	Hectare
HPL:	Himal power Limited
ICIMOD:	International Center for Integrated Mountain development
IEA:	International Energy Agency
INGO:	International Non-Governmental Organisation
ITC:	University of Twente., Faculty of Geo information Science and Earth Observation
IOE:	Institute of Engineering
KGEMU:	Kali Gandaki Environment management Unit
Km:	Kilometer
KU:	Kathmandu University
KUSOM:	Kathmandu University, School of Management
LA:	Land Administration
LAS:	Land Administration System
MoWR:	Ministry of water Resource
MoV:	Means of Verification
Mw:	Megawatt
NEA	Nepal Electricity Authority
NGO:	Non-Governmental Organisation
NHA:	Nepal Hydropower Association
OVI:	Objectively Verifiable Indicators
PAF:	Project Affected Family
SPAF:	Seriously project affected families
SPSS:	Stasticial Package for Social Science
SWOT:	Strengths, Weaknesses, Opportunities, Threats
UNECE:	United Nations, Economic Commission of Europe
UNESCO:	United Nations Education, Scientific and Cultural Organization
UTHEPL:	Upper Tamakoshi Hydroelectric project Limited
UTHEP:	Upper Tamakoshi Hydroelectric Project
VDC:	Village Development Committee
WCD:	World Commission on Dams

LIST OF GLOSSARY

Nepali words

Bari:	Dry field, garden for agriculture and production.
Birta:	Birta was an assignment of income by the state to individuals to support their livelihood.
Damai:	Tailor
Guthi:	It is a type of institutional landownership allocated for religious and charitable objectives. This type of land is allocated for temples or charitable organizations.
Gumbas:	Religious place for Buddhist
Jagera:	Reserved land.
Khani:	Source
Kharbari:	Less productive land. Field for growing grass use for roofing
Khet:	Field for agriculture and production (wheat, paddy, potato etc.).
Kipat:	Kipat was essentially a form of communal tenure at the eastern part of the country.
Pakki:	House made up of heated bricks.
Pani:	Water
Rakam:	Rakam was similar to Jagir land but it was allocated as remuneration for conducting a specific function manually.
Raikar:	Raikar lands are privately owned with freehold right, indeed the tax to be paid.
Sarki:	Shoemaker

Technical terms

Dam:	It is the barrier built across a waterway to raise the level of water or to control the flow of water.
Desander:	Sand trap
FIVAS:	The Association for International Water and Forest Studies.
IEA:	The International Energy Agency is an autonomous body which was established in November 1974 within the framework of the Organization for Economic Co-operation and Development (OECD) to implement an international energy programme.
Mortgage:	A transfer in the interest of land for the security of a debt
PAF:	Project Affected Families denotes the affected families who lost their assets less than 50% to the project.
Parish:	A political subdivision of British country
Penstock:	An enclosed pipe that carries water to turbines.
Powerhouse:	An electrical generating station.
SPAF:	Seriously Project Affected Family indicates those affected families who lost their house or more than 50% of their income or land.
State land:	Property in the custodianship of the Central/National Government.
Talus:	Pile of rocks that accumulate at the base of cliff.
Transmission:	A system of conductor appropriate for conducting electrical signals effectively and efficiently between two or more terminals.
Tunnel:	An underway or underground passage.

Unit conversion

1 Hectare:	10,000 m^2
1 Megawatt:	1000 Kilowatt
1 Ropani:	74 ft * 74 ft = 5476 ft^2

1. INTRODUCTION

1.1. Background

Investment in hydropower development for public purpose is very important for the development of any country, which needs a huge quantity of land. As land can neither be decreased nor increased, it should be effectively and efficiently use in a sustainable way for social and environmental effects (Oluwamotemi, 2010). A component of hydropower projects occupies various types of land during its development.

Land tenure as one of the key component of land administration plays very important role for the sustainability of the environment and hydropower projects itself. Land tenure is the relationship which may be defined legally or customarily among people with respect to land (FAO, 2007). These relationship may be categorized as man to land relationship, man to man relationships and land to land relationships (Tuladhar, 2004). It is different in different countries even varies within a country. According to Agarwal (1996), cultural, political, economic situations, social systems etc. have influenced these different arrangements. Imposing a certain land use to private owners interferes in the characteristics of the private property rights, also called the 'bundle of rights' that constitute a private property right.

Considering economical, technical, and environmental benefits, hydropower can be a very important contributor to meet the future energy needs in developing countries. They have a great need for electricity and also have the largest remaining hydropower potential (Klimpt et al., 2002). Indeed, many countries look upon hydropower as a key to their future economic development. Hydropower consisting of major components like dam, intake, canal, desander basin, fore bay, penstock, powerhouse, tail race, transmission line etc. is the main source of electrical energy of Nepal. Nepal is one of the Himalayan countries with a high power potential. It has theoretically hydropower potential of 83,000 Mw and economical potential of 43,000 Mw. At present, the installed capacity of hydropower is less than 1000 Mw, less than 2% of the total economically feasible potential (Sangroula, 2009). Less than 40% of Nepalese currently have access to electricity and those who do have electricity are reeling under a load shedding schedule. The country now move forward to enhance her strength and mitigate the risks involved realizing: *Nepal KO Pani*, *Pragati KO khani* (Literally: 'Nepal's water, Source of national development').

The Bathurst declaration mentions that "*Sustainable development is not attainable without sound land administration*" (UN/FIG, 1999). On this background, there is an urgent need for the country to develop a sustainable path for the generation of energy which has direct relations on land tenure to benefit the country.

The main aim of the research is to assess the role of land tenure in various stages of hydropower development to minimise negative social and environmental effects. It identifies key stages of hydropower development, land tenure forms and allocations, land acquisition procedures, key land tenure stakeholders and their role in hydropower development in planning and implementation. One case study in Upper Tamakoshi Hydroelectric Project (UTHEP) in Nepal is carried out for the research. The scope of the research is limited to study one case in UTHEP because of time constraint.

1.2. Research Problem

Public land acquisition is not successful in many developing countries (Ogunlana et al., 2001). It is the challenging work which may enhance conflicts as well as social and economic problems associated with it. People are unaware about land acquisition procedure and about the long term benefit from the projects due to lack of access to information and transparency about the projects (Oluwamotemi, 2010). Approach used for land acquisition shows that access to information about the land acquisition procedure is not maintained which brings the conflict and ultimately hinders progress for hydropower development. Hence, the hydropower development projects either delayed in construction schedule or suspended in operation phase. Comprehensive land related information is essential for proper planning of the area and in decision making (Tuladhar, 2004). Timely available of spatial information helps to minimize the spatial conflicts by assisting on finding a more socially acceptable solution to issues like land ownership (Kolte et al., 2008). But in developing country like Nepal, access to and dissemination of information during allocations and acquisition of land is not so well considered for hydropower development.

Public participation and access to land with full social and environmental benefits are essential for sustainable hydropower development. Community driven land use plans and implementation are an important step to reduce land use conflicts (OECD, 2001). In many developing countries, top down approach for policy formulation is mostly adopted in planning and public participation is hardly available in the process of planning and project development. Citizens are put on rubberstamp advisory board for getting their support in the name of public participation (Arnstein, 1969). One of the infrastructure development project "The Yadana Natural Gas Pipeline Project" is an example of a project which suffered the effects of public demonstration because project sponsors didn't address concerns of the public in a proper manner during environmental impact assessment (EIA) study (Ogunlana et al., 2001). Similarly, Upper Kotmale Hydropower Project in Srilanka got delayed for a very long time due to heavy protests against the project implementation causing considerable financial losses to the country. The reason for the delay was lack of public consultation during the project planning stage (Nandalal, 2007).

On this background, it can be said that there is knowledge gap of involving public participation in developing countries which hinders the progress of hydropower development. Non-public participation and non-access to information are one of the problems for sustainable hydropower development in the country.

The international pressure for the sustainable development and poverty eradication has effect on the appropriate land rights for the poor and marginalized people. In developing countries like Nepal, hydropower development plan mostly focus on technical component whereas issues related with land tenure such as tenure forms and its allocations, land acquisition procedure and role of land tenure stakeholder at various stages of development has not been focused in the development plan. Hence, most of hydropower projects are not sustainable. No any scientific research has been carried out to date to assess the role of land tenure in hydropower development.

1.3. Motivation

According to the perspective of developer, among the many hindering aspect for hydropower development in Nepal, policy inconsistencies and planning deficiencies are the important one. A better understanding of the causes and effects of land tenure help policy maker to gain insight into the policies. These policies contribute to the problem solving and decide which measures are appropriate for reducing it. It is necessary to consider tenure forms, allocations and land acquisition procedures in planning and implementation stage. It is equally important to define the role of land tenure in hydropower

development. The research is motivated from need of focus on land tenure for sustainable development in hydropower development plan.

Being experienced in some of the hydropower projects in professional life, academician in the field of civil and geomatics engineering and MSc. Land Administration (LA) student, this topic attracts us to know the integration procedure between the knowledge of technical science and social science in the field of hydropower development. The motivation for this research is that it assesses the role of land tenure for sustainable hydropower development.

1.4. Research Objective

The following subsections highlight the main and sub objectives of the research.

1.4.1. Main objective

The main objective of this research is to assess the role of land tenure in hydropower development for social and environmental effects.

1.4.2. Sub objectives

To support the main objective or as the consequences of the main objective, it is divided into the following sub objectives.

I. To find out land tenure requirements in the planning process of hydropower development.
II. To define the role of land tenure stakeholders in hydropower development and implementation.

1.5. Research Questions

The following subsections mention the general and sub questions for the research.

1.5.1. General question

What is the role of land tenure in hydropower development for social and environmental effects?

1.5.2. Sub questions

To support the main question, it is divided in the following sub questions. The first three sub questions are formulated to support the first objective and remaining three questions are formulated to support the second objective.

Sub questions for sub objective I

(a) What are the current practices in planning hydropower development?
(b) What are the experiences available that include land tenure during the planning and implementation phases?
(c) What are the causes and social and environmental effects in changing land tenure by the hydropower development?

Sub questions for Sub objective II

(d) What are the roles of key stakeholders that concern with land tenure in hydropower development?
(e) How do they support for minimizing land conflicts in balance with environmental and social effects?
(f) To what extent public participation and access to information help resolving land conflicts in hydropower development?

1.6. Research Hypothesis

Hydropower development creates conflict in land rights and land uses.

1.7. Research Approach

The approach for this research includes formulation of conceptual framework, research design, research methodology and research stages which are discussed in the following subsections.

1.7.1. Conceptual frame work

A conceptual framework is developed to carry out this research in a structured way. Land rights/uses, hydropower development and society/environment is the key components of the research. When hydropower development plan does not focus on land tenure, it creates conflicts in land rights and uses while conflicts on land rights/ uses effect hydropower development by making it unsustainable. Further, when conflicts in land rights/use exist, society is disturbed and society cannot invest for land use. The disturbed society hinders the smooth development of the project and unsustainable hydropower projects cannot provide the better opportunity to the society in terms of economic development activities and employment.

Aspects are the breakdown of evaluation areas. An evaluation area in this research is considered as scope (stages) which is discussed in chapter 3 in more detail. Various aspects such as policy, Governance, tenure and rights, land acquisition, threats and power degree, external factors and impact aspects are conceptualised for an assessment which are discussed in detail in chapter 3. The Figure 1.1 gives an overview of the conceptual framework.

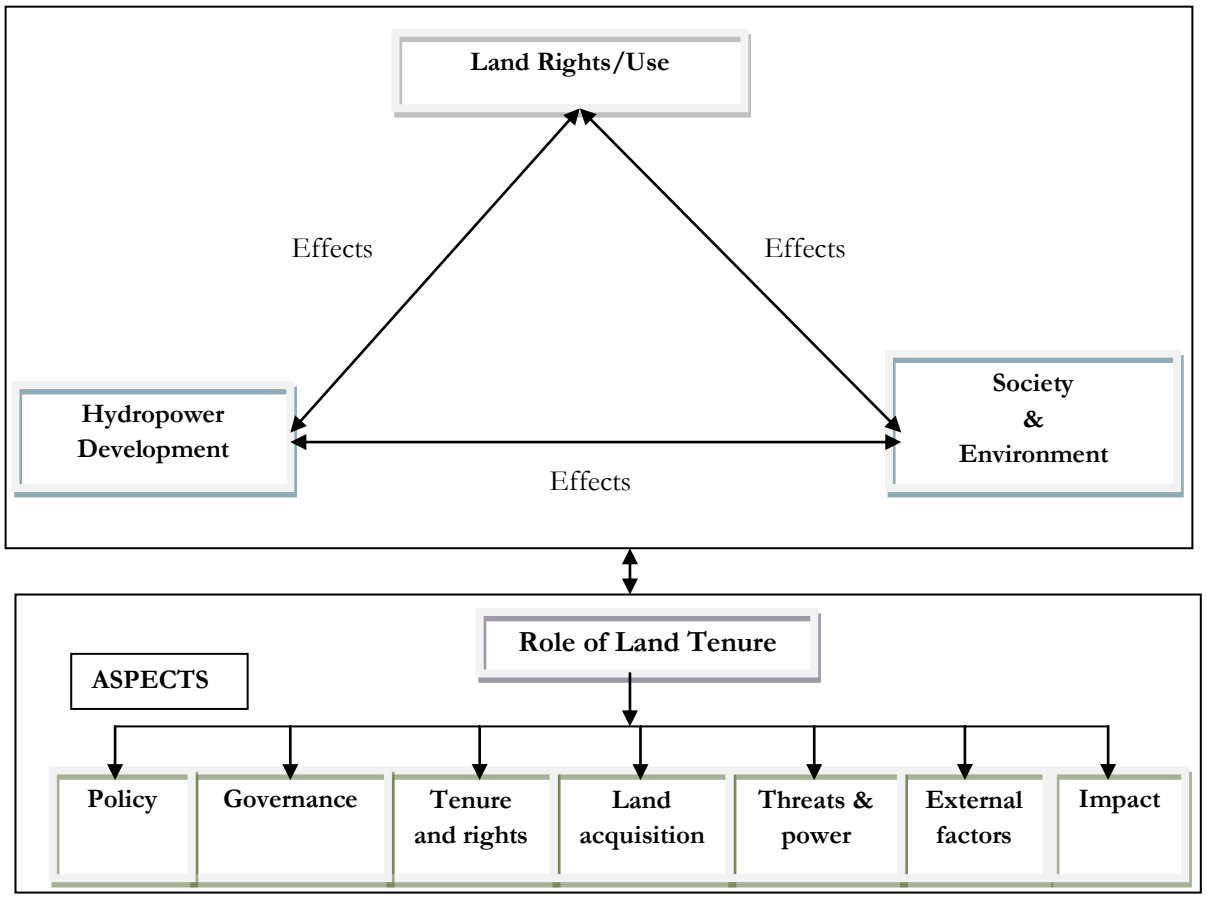

Figure 1.1.Conceptual Framework

1.7.2. Research Design

Research design involves the logic which connects the various data to be collected to initial research questions of study (Yin, 2003). Based on this definition of research design, the research objective and question are formulated to address the research problem. Various key aspects, elements, indicators are identified to assess the role of land tenure. Various data collection methods are identified for collection of data for case study. After data processing and analysis, an assessment of role of land tenure in UTHEP is carried out in the research. With discussion on assessment results and role of land tenure in hydropower development for social and environmental effects, conclusions are drawn and some recommendations are given to enhance further research. Finally, thesis report is the outcome of the research. An overview of the research design is shown in the Figure 1.2.

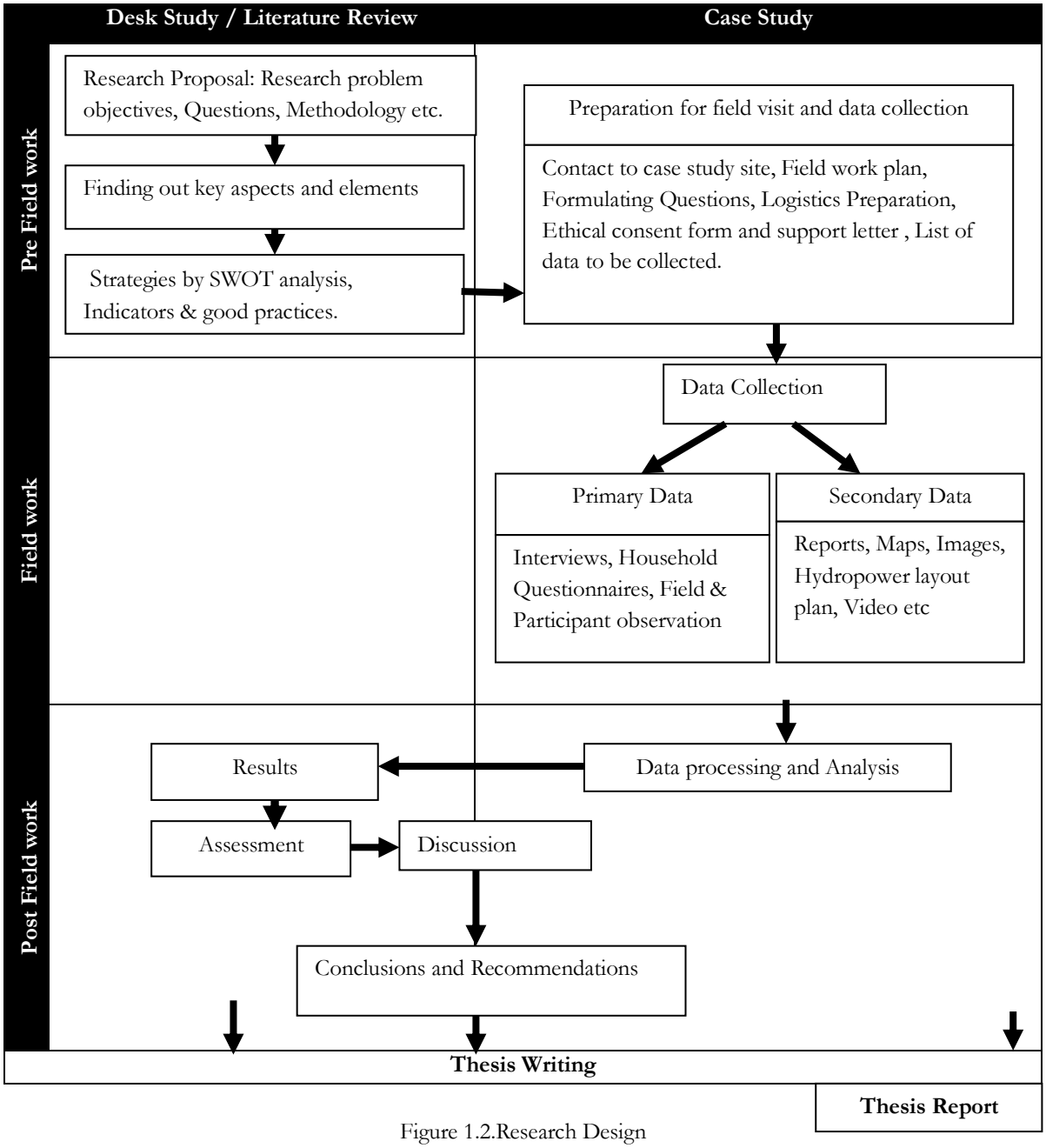

Figure 1.2.Research Design

1.7.3. Research methodology

This research has followed two methodologies; methodology to understand the concepts and methodology to see the reality. It means the desk study and case study are the methodologies selected for this research. The desk research is followed by the literature review. The research is started with critical reviewing of scientific literature in the land tenure in hydropower development. The review contributes to make the theoretical foundations for the case study in UTHEP. It further is used for defining key stages, aspects, elements, strategies, indicators and good practices criteria for assessing the role of land tenure. Identification of data required before the field work and data analysis are supported by literature reviews.

Scientific literature such as journal articles, conference papers, books and documents including research/project reports are used for the purpose of this research and are mentioned in reference section. One case of land tenure in hydropower project in Nepal is studied to draw out the result.

A case study is selected to carry out in depth study within limited period of time to know role of land tenure in hydropower development. A case study is at UTHEP (456 Mw) in Nepal. The spatial and non spatial data are collected to assess the role of land tenure in UTHEP. An overview of the research methodology is given in the Figure1.3.

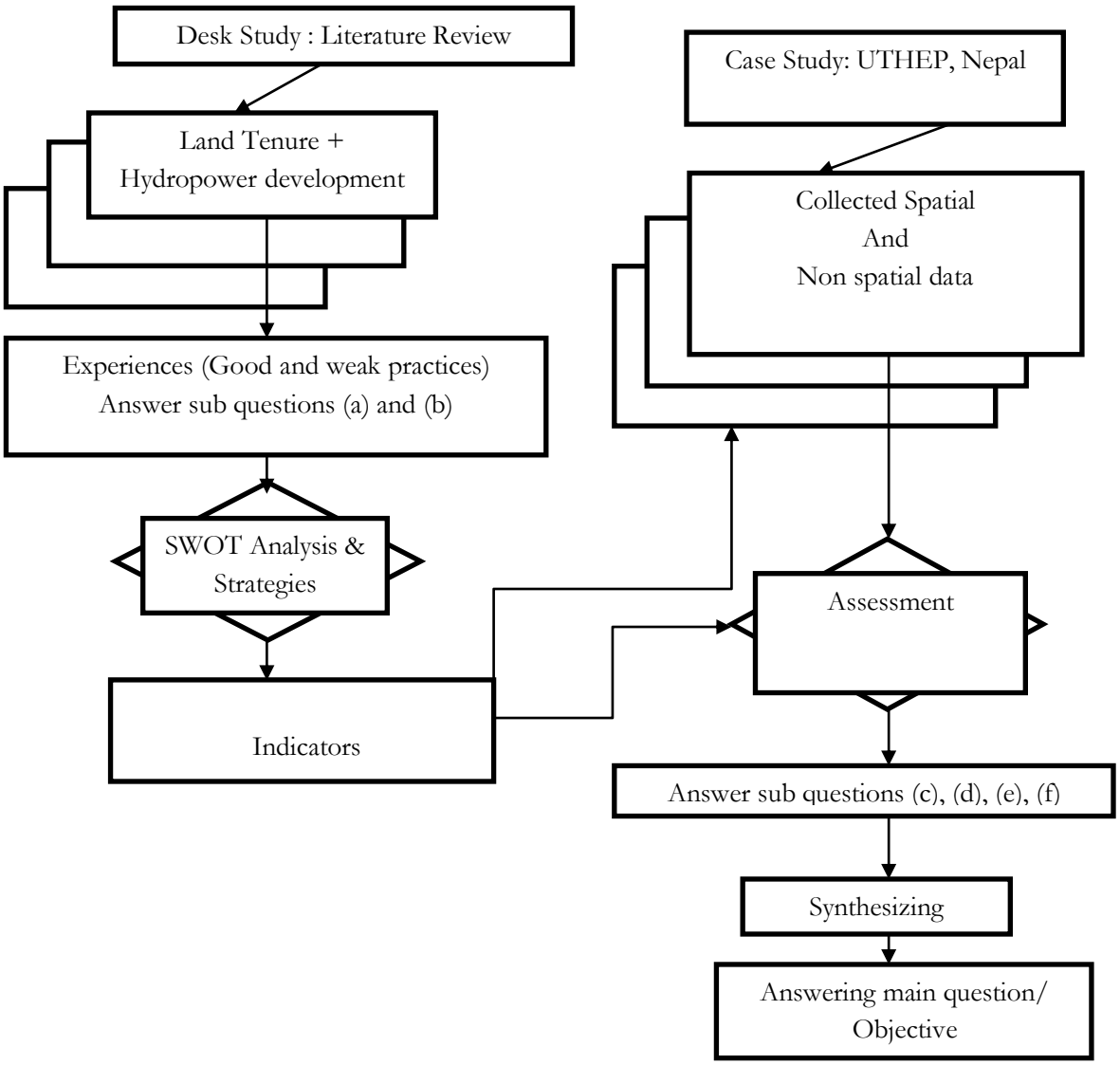

Figure 1.3.Research Methodology

1.7.4. Fieldwork stages

The three major stages of field work in this research are pre-field, field and post-field which are discussed in the following subsections.

1.7.4.1. Pre field work stage

The pre-field work stage was started with literature review. Literature review is carried out to prepare the research proposal as the first step of the research. The set of indicators are developed and used to formulate questionnaires for qualitative and quantitative data collection methods such as interviews and household questionnaire. The type of questions is structured and semi structured. Necessary preparation for field study such as identification of data needed, contacting to case study site, consent form to maintain ethical aspect, identification of methods, list of potential respondents as individuals and organizations to be interviewed in the field and necessary logistics were done before going to fieldwork.

1.7.4.2. Fieldwork stage

A field visit was performed from 10th September 2010 to 10th October 2010 to field study site in Nepal. Important personalities from Upper Tamakoshi Hydroelectric project Limited (UTHEPL), experts/ academia, civil society members, Village development committee (VDC) heads and some affected families of the project area were contacted by visiting to Nepal for interviewing and household questionnaire. Field observation, participant observation and document study was carried out to collect spatial data, to observe land acquisition procedure and to collect various socio economic data respectively. The objective of the field observation was to observe land use pattern in the project area. The impression of the field observation was noted on field note.

The reports like detailed feasibility study of case study project; Environmental Impact Assessment (EIA) and property valuation report were collected and are used for collecting spatial and socioeconomic data. The empirical data was recorded in field notes and audio. An audio recording was performed during interviews to collect the information and to review it later on. The demarcations of spatial components were done on available maps and images. The different types of data collected in the case study area are as follows.

- **Spatial data**

It is divided into primary data and secondary data. Primary data consist of field verification of hydropower development layout plan, image, cadastral maps and topographic maps. The objective was to verify the actual situation of ownership pattern and land use in the area. In the other hand, secondary data from cadastral maps and aerial image were used to know the actual situation in the area. Hydropower development layout plan of the project was used to know the location of various hydropower components of the project.

- **Non spatial data**

The primary socioeconomic data are the non spatial data acquired from household questionnaire, interviews, participant and field observations. The secondary socioeconomic data was obtained from official documents, report like detailed feasibility study of the project, EIA and property valuation report.

1.7.4.3. Post field work stage

This stage is started with the data management of collected raw data from case study site and text data acquired from literature review. Data processing is carried out after the proper organization of the data. Quantitative data is processed by using software Stasticial Package for Social Science (SPSS) version PASW statistics 18. Arc map and Auto CAD 2009 are used for the processing of spatial data. The result of the data analysis is used for the assessment of land tenure in UTHEP. Then discussion on the assessment

results is performed, which assess the role of land tenure in hydropower development for social and environmental effects.

1.8. Thesis Outline

A thesis of seven chapters with some appendices is the output of this research. The list of chapters is given as follows.

Chapter 1: Introduction
The chapter presents an overview of this research including research background, research problem, motivation, research objectives, sub objectives, questions, sub questions, hypothesis, conceptual framework, research design and methodology of the study and fieldwork stages.

Chapter 2: Land Tenure in Hydropower Development: A Review
This chapter gives a theoretical overview of land tenure in hydropower development through critical review of literatures. The key stages of hydropower development, land tenure and land administration in hydropower development is discussed in this chapter. A land tenure experiences in hydropower development in various countries is the next content of this chapter. The social and environmental effects of land tenure in hydropower development are mentioned on it.

Chapter 3: An Assessment Framework for the Role of land Tenure
This chapter defines an assessment and an assessment framework. It also highlights on need, importance and approaches for an assessment framework. An assessment framework developed for this research is mentioned in this chapter. The scope, aspects and elements are identified in this chapter. Similarly, the strategies, indicators and good practice criteria are defined for an assessment.

Chapter 4: Data Collection Methodology
This chapter introduces to case study area and approach for designing questionnaires. It reports the preparation for data collection, data collection methods adopted and some ethical and quality aspects that is considered for the research. Further, it discusses on challenges faced on the data collection and various types of data processing carried out for the research.

Chapter 5: Data Analysis and Assessment
This chapter contains method for data analysis and an assessment. Then the assessment of the role of land tenure in case study based on these results of data analysis is the next content of this chapter.

Chapter 6: Discussions and role of land tenure
This chapter discusses on the assessment results and the role of land tenure in hydropower development for social and environmental effects.

Chapter 7: Conclusion and recommendations
The conclusion based on research main/sub questions and main/sub objectives are made in this chapter. The recommendations for further research are also the content of this chapter

2. LAND TENURE IN HYDROPOWER DEVELOPMENT: A REVIEW

2.1. Introduction

The main objective of this chapter is to have theoretical overview of land tenure in hydropower development for social and environmental effects through critical review of literatures. Firstly, various stages in hydropower development are discussed to know how land tenure issues interact on these stages of hydropower development. After determining the key stages of hydropower development, the importance of land tenure and land administration in each stages is described in the next section. This section mainly focus on tenure forms and its allocation, land acquisition, stakeholders and their role in hydropower development. An experience of land tenure in various hydropower developments in different countries are reviewed after having theoretical knowledge on these tenure issues. This includes land tenure experiences in hydropower project of Norway, China and Nepal. Land tenure experiences in Kali Gandaki "A" hydropower project of Nepal is described in section 2.4 and subsection 2.4.3. The next section helps to determine social and environmental effects. The summary in the section ends the chapter.

2.2. Stages in Hydropower Development

It is necessary to know the various stages of hydropower development to identify how issues related with land tenure interconnects in each phase of hydropower development. The hydropower development mainly consists of five stages. The political decision making, planning and detailed feasibility, project design, implementation and operation are the key stages for hydropower development (Oud, 2002).

In the political decision making stage, site selection of the hydropower project is proposed (King et al., 2007). The land policy, hydropower policy and environmental policy of the country guides the political decision making process.

In planning and detailed feasibility stage, a reconnaissance and preliminary study (L section, cross section survey) is carried out and detailed economical and technical feasibility of the projects is studied in detailed feasibility phase. The land allocation for hydropower development is carried out in this stage. Current practice of land use planning considers project as part of bundles of environmental, social and technical measures to fulfil the needs in an efficient way (GTZ, 1999). This involves various stakeholders such as affected people, government, private sectors etc. Currently, multi criteria planning procedure is in practice. Public /private sectors are involved in the planning procedures for the hydropower development. The preparation of detailed project report is carried out in planning and detailed feasibility study.

The design stage starts after the completion of the planning and detailed feasibility study. The project design is based on technical parameters and environmental review is performed in design stage (Cheng, 2008). Land tenure should be considered early in design phase for effective management of environmental issues (Galudra et al., 2009). Forestation and deforestation because of the projects should be considered in design phase.

The land acquisition, power purchase agreement, implementation agreement are carried out in implementation stage and construction work are carried out in implementation phase. All the mitigation measures are implemented in the implementing phase (King et al., 2007).

The mitigation measures are monitored in construction and operation phase (King et al., 2007). Mostly, post evaluation of environmental impact (EI) is carried out in operation phase of hydropower development (Cheng, 2008).

2.3. Land Tenure and Land Administration in Hydropower Development

The importance of land tenure and land administration (LA) in all stages of hydropower development is for the sustainability of the hydropower project. The sustainability of the hydropower projects creates economic development which ultimately enhances the poverty reduction in the country. Therefore, efficient and effective LA is very essential for sustainable development (Williamson & Grant, 2002).

In political decision making stage of hydropower development, LA is capable to support the ever changing relationship between land and humankind to promote complex decision making. Hydropower developments that contribute to successful land use require LA to balance private rights in planning and feasibility stage. The most important incentive for investment in land is high perception of land tenure security. If the perception of land tenure security is weak, investors are not investing since there might be risk to get profit from the investment. Land tenure security supports transferability of land, greater investment incentive, more sustainable management of land resources etc. The sound LA with appropriate parcel based geo information system is very essential for the people and government to ensure good tenure security with efficient and effective land transactions (Tuladhar, 2004). In the design stage, LA supports by fostering good governance and stakeholders expectation. In implementation stages, LA supports in land acquisition by providing the proper information of land ownership, land value and land use. In operation stage, LA supports for improving the social and environmental impacts taking account on the stakeholders' satisfaction.

LA for sustainable development is very essential for anyone interested in environment and resource management, economic development and balancing property rights (Williamson et al., 2009).Therefore, LA should be focused in all stages of hydropower development.

2.3.1. Tenure forms and allocation in hydropower development

Land tenure has strong relationship for any objectives of land use planning (UN/ECE, 1996). It has strong interrelationship of right, restriction and responsibility for land use. Generally, two forms of land tenure are found i.e. land tenure that is influenced by western law and by traditional laws or customary laws. First form of land tenure is influenced by German/Roman law following by Germany and France. First form of land tenure is also guided by socialistic thinking (Tuladhar, 2004). The second form is influenced by customary land and is directed by traditional or customary laws. The customary land has been developed based on various religions, beliefs and law of ethics that developed laws relating to the use of land (Larsson, 1991). Lands are also allocated for religious purposes to maintain social customs toward god in many developing countries. In such case, religious social group entertain the uses and economic profits of such land for purpose of the community (Tuladhar, 2004). The private property, state property, common property and open access i.e. systems with unrestricted (open) access to resources are the four fundamental property rights system. The freehold, leasehold and communal ownership are the ways in which property can be exercised by different parties (Tuladhar, 2004).

The construction of hydropower development needs huge interferences of land ownership. Land should be allocated precisely during hydropower development in planning and feasibility stage because the implementation of new plan converts the land use of the area. Hydropower development also interferes in various land use rights in its development. These interferences generally cannot be avoided during development of the infrastructure project (GTZ, 1998). Planning in religious, cultural sites and historical settlements is very difficult because of conservation rules and regulation. The rehabilitation of the old settlements needs huge expenditure than any other assets (Altunbas, 2007). Leases are flexible procedure where customary land holders have the potential to satisfy the requirements of investors and also enable them to return ownership (AusAID, 2008). The hydropower development is allocated in various kinds of land use such as forest land, agricultural land, barren/cliff land, pasture land etc. Land use planning is an instrument of the technical cooperation used in various projects like rural regional development, resource management (GTZ, 1999). Therefore, land use planning as an instrument is also very essential during hydropower development to minimize social and environmental negative effects. The allocation of land for hydropower development can be handled with technical planning approach and participatory planning approach. In the technical approach, any social conflicts are disregarded in the process whereas conflicts resolution is done by consensus in the participatory planning approach.

Public participation in planning process depends on governance structure of the country. It is important to promote the adoption and harmonization of environment criteria in the planning, design and implementation phases of hydropower development (King et al., 2007). During planning emphasis should be given to promote the disadvantaged group and to improve their access to land resources. Access to information and participation is very essential to serve the interest of public ownership of land as they intended to create transparency and informed stakeholder participation to reduce the land conflicts (Nnkya, 1998).

2.3.2. Land acquisition for hydropower development

The procedure and practices of land acquisition for hydropower development vary among the countries. There are various ways of acquiring land such as voluntary purchase, land consolidation (readjusting) and compulsory purchase. The transaction or exchange of land is known as voluntary purchase (Seppanen, 2004). The land readjustment allows land assembly, especially when budgets for compulsory purchase and infrastructure provision are limited. The method enhances development by re-parceling of land for better planning and distributing the benefits of the development (Home, 2007). Instruments of land tenure such as land valuation before and after project implementation, selling and buying of land from land markets, long and short term leasing, land consolidation, land readjustment and mobilization of land with project specific land banking is considered for the construction of infrastructure project (GTZ, 1998). In other hand, compulsory purchase is the expropriation of land with ownership right or use right. The idea for the expropriation comes from sovereign's power of eminent domain. This power permits the state to acquire private land for the benefit of the society and is undertaken worldwide (Kitay, 1985). Compulsory purchase is one of the way in which local and national governments acquire land for development purpose (Viitanen & Kakulu, 2009).

Expropriating land with low market value is the common existing approach for the land acquisition in developing country to develop any infrastructure. High caution is required while acquiring land for public purposes during the process of expropriation. Nonpublic participation at various level such as information collection, consultation and decision making is the other problem for peaceful land acquisition for any development project (Ogunlana et al., 2001). Most of the projects are delayed because of land conflict caused by expropriation of land with low market value or cost value (Belej & Walacik, 2008). In the case of international project Lekki Free Trade Zone (LFTZ) in Nigeria, compensation was paid not only for land but also for economic crops such as cocoa, palm trees etc. The resettlement was also including with

compensation. The resettlement area includes infrastructure like road, water and other utilities in this project (Oluwamotemi, 2010). Analyzing the land acquisition processes adopted in that project, it can be concluded that participation is essential for peaceful land acquisition. The community involvement on sharing the investment and the benefits of the project can be carried out for minimizing conflicts during land acquisition. It is also carried out for better livelihood of the people.

2.3.3. Land tenure stakeholders in hydropower development

The stakeholders are the interested parties that may be governments, communities or individuals which has a traditional, current or future right for decision for the use of land (FAO, 1995). It is also defined as the groups affected by actions, policies and decisions (Groenendjik & Dopheide, 2003) . These are parties having indirect or direct interconnection with the selection of the project area, allocations of land and acquisition of land in all development stages such as decision making, project planning, design, implementation and operation (guoqing & shaojun, 2004). Since sustainable success of projects totally depends on the claims and need of the stakeholders (GTZ, 1998), their expectation should be considered in development plan. The objective of stakeholder analysis is to briefing the role and responsibilities of key stakeholders to influence actions and fields for possible engagement related to decision making, planning, design and implementation of hydropower projects.

The major group of stakeholders in hydropower development in national level are categorized as government, developers, community and other water users, law institutions and financiers and other interested parties (King et al., 2007) whose role and responsibilities in various stages of hydropower development are discussed as follows.

a) Government (at national, provincial, local and basin levels)

National governments are responsible for strategic planning like planning for physical security of the land in planning stage. It is achieved by ensuring natural human occupation in their territory and energy development and settlement of extra population from other different parts (FAO, 1995). State, provincial governments/ district or municipal authorities are the key stakeholders responsible for the prosperity of the people in their administrative boundaries. They want to stimulate or to dissuade settlements in rural areas but is required to get revenues for their administrative duties (Holzknecht, 1996). These stakeholders are involved in decision making, planning, design, implementation and operation stages of project development (GTZ, 1999).

b) Developers (owners and operators)

This category of stakeholder includes Government utilities /agencies, State Owned Enterprises and private sector developers. State agencies has strategic planning of energy mix in planning and feasibility stage, selection of priority projects in decision making, mobilization of finance and contracts in implementation stage whereas private sector is responsible for negotiation of concessions, implementation including environmental and social safeguards (King et al., 2007) in implementation stage.

c) Communities and other water users (adversely affected)

This category of stakeholder consists of project affected people, beneficiaries (urban, rural, and industry) and watershed communities. Beneficiaries have active participation in determining needs and means to deliver services and have interest on payment for services. The project affected people have meaningful engagement in planning processes for deciding options and mitigation measures in planning stage. Long-existing rural communities are the stakeholders with individual or communal ownership of land that should be of enough size to ensure their basic livelihood (Ouedraogo, 2004). Tourists or Urban communities in the area are the stakeholders responsible for rural recreational activities. These stakeholders are mostly involved in implementation and operation stages of hydropower development.

d) Law institutions and Financiers (domestic / foreign)

The role of law institutions and notaries are to prepare the deeds for transaction in implementation stage. Broker maintains understanding between buyer and sellers. This category of stakeholders includes private or public banks, financial institutions. Financiers are responsible for lending mortgage loan and grants. They have their responsibility in decision making, planning, design, and implementation and operation stages of hydropower development.

e) Other interested parties

It involves local organizations, International non-governmental organization (INGOs)/National governmental organizations (NGOs) and private sector (consultants, contractors, professional associations, experts, industry groups and academia). NGOs/INGOs are responsible for enhancing one or more specific goals. They have public interest goals of maintaining ecological or historical values (Holzknecht, 1996). Scientific-interest NGOs has focused on the long and short term effects of land cover / land-use changes. Similarly, religion-inspired NGOs are related on social well-being of pert-urban or rural people or the conservation of holy places (FAO, 1995). Land tenure experts have an advisory and judgments role on various land tenure aspects. Consultative group organize the land policy dialogue for land tenure security. The committee prepares policy guidelines to support the process and appoint independent experts to perform the policy dialogue activities (Ouedraogo, 2004). Contractors are responsible for preparing muck disposal plan and management of labor camp. Surveyors are responsible for cadastral surveying and updating cadastral data by separating clear boundary, boundary conflict, and affected area. These category of stakeholders are mostly responsible for planning, design implementation and operation stages (GTZ, 1999).

2.4. Land Tenure Experiences in Hydropower Development

The land tenure experiences in hydropower development of Norway, China and Nepal is reviewed to know the good and weak practices in different hydropower projects. Land tenure experiences of only these countries is reviewed because of various form of land ownership and its allocation, land acquisition procedure and stakeholder's role in these countries and time constraint for the research. Land tenure experiences of Kali Gandaki 'A' and Arun III hydropower project of Nepal is discussed in the section 2.4.3.

2.4.1. Land tenure in hydropower development in Norway

A land tenure experience in hydropower development in Norway is discussed in the following headings.

(a) Stages in hydropower development

The major stages in hydropower development in Norway are the decision making, planning and feasibility study, design, implementation and operation as reviewed from development of Alta hydropower project and Aurland hydropower project. The site selection of the Aurland hydropower project is proposed in decision making stage based on the land policy, hydropower policy and environmental policy. During the decision making open discussion is held at local, regional and national level (UNEP/DDP, 2001). In the planning and feasibility phase, the possible social and environmental impacts are identified caused by the reservoir development in Alta Hydropower project. The land allocation for the hydropower project is carried out in this stage. The different component of Alta Hydropower project such as dam, reservoir etc. is designed in design stage (IAHS/ICWRS, 1998). In implementation stage, land acquisition, power purchase agreement and environmental consequences are carried out and monitored in operation phase. The hydropower development in Norway is based on broad public participation to ensure that all the interests are recognised and taken into consideration at several stages of the development process (UNEP/DDP, 2001).

(b) Land tenure forms and allocations

Norway has private land, state land and common land and most of agricultural land has private ownership. There are also three main types of common land in Norway: state common land, parish common land, and land jointly owned by estates (Goodale & Sky, 2000). It has 37% forests lands, 3% arable lands, 44% highlands, freshwater surface and wetlands and rest 16% glaciers, snowfields and talus slopes and about 96 % of all farm units are owned by private owners.

The local commune has decisive influence in using and transferring of agricultural and forest land (Anderssen, 1998). The common land and private land is allocated in development of Alta Hydropower project. It is allocated in forest land and arable land. Hydropower in Norway is assumed to be a natural as well as a local resource that involves comprehensive planning processes. According to International Energy Agency (IEA) Hydropower Implementing Agreement Annex VIII (2006), land use planning is well considered in Aurland hydropower development project. The various ways to minimize negative effect of construction on the cultural and natural landscape were considered in its development. These measures include extensive use of tunnels in road construction and re-vegetation of the disposal site and quarries. Because of technical development such as tunneling and underground constructions, the environmental impacts were also limited. Aesthetic aspect of the project area is maintained from this technical development because large part of the installations is not visible and results no impacts on the surroundings above earth. The landscape before and after the vegetation in the quarry site of Aurland hydropower project is shown in the Figure 2.1.

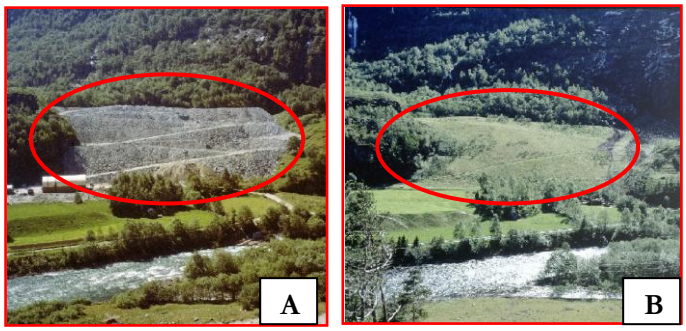

Figure 2.1.Rock deposit (A) before and (B) after vegetation (Photos: P.O. Breifjell)

This hydropower development got success because local groups are involved for improved road construction and considers the land tenure during the planning of hydropower development. Access to information and compensation procedure was well planned and implemented during hydropower development. The capability and economical willingness to include land and environmental issues from the start of the project to operation made the development successful.

(c) Land acquisition

The Watercourse Regulation Act grant permission for all hydropower projects with a concession to expropriate all essential rights needed to construct the project. Based on this law, any group is, in exchange for economic compensation, obliged to withdraw land and rights from landowner as needed to complete the hydropower project. The renouncing of land and related rights is negotiated in a non-controversial manner with negotiations and agreements. However, the law also includes the legal tool to expropriate if required and is carried out by the concession (WCD, 2000). The project owner gives the considerable compensation to both the commune and affected families for acquirement of a locally available natural resource. Public participation and access to information is maintained during land acquisition. According to IEA Hydropower Implementing Agreement Annex VIII (2006), mitigation measures have been applied continuously during implementation phases and have been evaluated for minimizing negative environmental effects like in Ulla-Forre Hydropower complex. Compensation was

distributed to owners of fishing rights and also compensates the loss by release artificially produced salmon. Deforestation was mitigated by the plantation of new trees.

(d) Stakeholders and their role

According to FIVAS (1996), the main stakeholders of hydropower development are the consultants for providing consultancy services in decision making, planning, design and implementation stage of the project, contractors for the construction of dam, tunnel, labor camp and preparation of muck disposal plan etc. in implementation stage. Project owners and investors are the stakeholders for bilateral development aid project in all stages. An environmentalist plays very important role for protection of forest, conservation of national parks i.e. overall effect on environment in decision making, planning and feasibility study, implementation and operation stages of hydropower development. Regarding the role of state in respect to land use, state controls over land use. In addition to land act and plan building act is carried out by state with national legislation in hydropower development (Anderssen, 1998). National assembly gives the final approval of hydropower projects in decision making stage.

2.4.2. Land tenure in hydropower development in China

A land tenure experience in hydropower development in China is described in the following headings.

(a) Stages in hydropower development

The main stages of hydropower development in China as reviewed from Nu river project are decision making, planning and feasibility study, investigation, design, construction and operation. In the decision making stage, national macroscopic policy study is carried out for hydropower development. Hydropower development and resettlement policy guides the decision making stages in Nu river project (Brown & Xu, 2009). Environmental policy prepared by the state environmental protection administration supports in decision making during the site selection. Hydropower and water resource planning and management of national river basin are carried out in planning stage. Hydropower resource survey is also done in this stage. The design stage is started after engineering examination including the approval of prefeasibility and feasibility productions. The construction, supervision and monitoring activities are carried out in implementation and operation phase of hydropower development (Cheng, 2008).

(b) Tenure forms and allocations

The land tenure system in China is based on written law: Constitution and Land Administration law of People's Republic of China. It can be divided into three types of right i.e. ownership, use and other rights that include mortgage, easement, lease etc. Two types of ownership of land are found in China i.e. state owned land and collective owned land (Renzhong & Chengyun, 2005).

Both collective owned and state owned land are allocated for the hydropower development (Brown & Xu, 2009). Land use plan is not prepared in Nu river hydropower development. Many of the proposed dam is situated in UNESCO world heritage site and in the conservation area. Nu river project affects number of distinct ethnic groups who maintain their religious and cultural tradition. Resettlement is not possible on this ethnic group because of integration into population of various customs, languages and agricultural tradition (Brown et al., 2008). Because of lack of access to information and transparency in planning processes (Yardley, 2004), Nu river project faces obstacles in its development.

(c) Land acquisition

The compulsory acquisition of land has been in practice for hydropower development. State can acquire the collectively owned land and can change into the state owned land. The concessions procedure is also followed in hydropower development but it is without broader negotiations and agreements. Therefore, Chinese hydro concessions are controversial (Ryder, 2008).

During the resettlement better oversight is not done to reduce the negative economic effect of displacement in Nu river project. It consists of 13-dam cascade, one of the largest hydropower development projects yet assumed in China. Several violations of the rules and regulations during land acquisition and compensation were observed including the lack of provisions to enable residents to continue farming after resettlement and the lack of input regarding the settlement process from the affected families themselves. Since villagers are forced to leave agriculture production, the livelihood of the affected families has not improved during development of Nu river project (Brown et al., 2008).

(d) Stakeholders and their role

Governments (Ministry of Transportation and Ministry of water resources), Environment protection Bureau and Water resource planning are the key stakeholders for hydropower development in China (Brown & Xu, 2009). Government prepares national hydropower standards for planning, design and implementation of the project. Private sectors and civil society, local communities, environmentalist, developers, NGOs, researchers, engineers, developers, contractors, consultants, investors, financing agencies plays an important role for the initiative of hydropower development (Bird & Phonekeo, 2010). The State Environmental Protection Administration (SEPA) propose the environmental action plan (Managi & Kaneko, 2006). All these kinds of stakeholders have their role either in decision making, planning, design, implementation or operation phases of hydropower development.

2.4.3. Land tenure in hydropower development in Nepal

A land tenure experience in hydropower development in Nepal is discussed in the following headings.

(a) Stages in hydropower development

The major stages in hydropower development in Nepal are the political decision making, planning and feasibility study, design, implementation and operation phase. The political decision making stage is influenced by hydropower development policy enacted in 1992 (2049 B.S.) and environmental policy supported by the national EIA guideline of 1993. Arun III hydroelectric project in Nepal was cancelled by World Bank since it has not focused on policies related with environment, resettlement and indigenous people and their participation in its stages of development (Udall, 1995). The planning and feasibility stage involves the allocations of land and propose the mitigation measures for the social and environmental negative effects. The design of various component of hydropower plant is carried out in design stage. Implementing stage involves land acquisition, construction and operation stage involves the monitoring of environmental effects. The post evaluation impact is carried out on operation stage.

(b) Land tenure forms and allocations

Until 1950, Nepal had statutory tenure system and customary tenure system. Statutory tenure system involved *Raikar, Birta, Jagir, Rakam, Jagera* and *Guthi* whereas the customary tenure system involved *Kipat* land existed in the eastern hilly region of the country (Acharya, 2008). During 1950, land tenure system of the country has been changed into private land, state land i.e. public and government land and g*uthi* land. *Raikar, Birta, Jagir, Rakam, Jagera* and *kipat* land are converted into private land. *Birta* abolition act 1959 was enacted to abolish the *birta* type of tenure system (Tuladhar, 2004).

Private land, state land (government and public) and trust lands are allocated for hydropower development in the country. Hydropower project is allocated in agricultural land, forest land, barren land and pasture land. In Nepal, land use planning has not considered in hydropower development plan. Transparency in information dissemination, decision making, involvement of key stakeholders on key issues and time bound solution can hardly be found during hydropower development (Shah, 2008).Therefore, hydropower projects are not sustainable. An EIA is to be carried with a detailed project planning, monitoring and mitigation plan (Rai, 2004).

(c) Land acquisition

Mostly, land is expropriated for the development of the hydropower project. The resettlement for the seriously project affected families (SPAF) is carried out for the development of the project. Regarding legal protection for ascertaining tenure security, Interim Constitution of Nepal (2007) ensures the right to own, acquires, dispose and sell the real property as a fundamental right. It ensures protection from requisition acquires or creates any encumbrances without proper compensation and ensures equity in terms of religion, gender, ethnicity etc. to own land.

According to Kali Gandaki Environmental Management Unit (2002), in 144 Mw Kali Gandaki 'A' hydropower project, Nepal Electricity Authority (NEA) acquired about 53.7 hectares of land and 57 houses for the access road. Similarly, 148.62 hectares land was acquired of which 94.2 hectares was private and *guthi* land for the main project features such as dam, powerhouse and site offices. An Acquisition compensation and rehabilitation plan (ACRP) is prepared as a project document following the process established in the Land Acquisition Act of Nepal. But institutional conditions like differentiating of affected people, low and unfair compensation, exclusion of directly affected families in compensatory procedures and lack of strong consultation processes enhances additional gaps that results instability amongst those affected by the dam intervention. Unless compensatory procedures are nicely laid out and implementation of plans is made transparent, hydropower projects are not sustainable in a developing country like Nepal with its limited land resources and intricacies of power within social relations (Rai, 2004).

(d) Stakeholders and their role

According to WSH (2007) Government ministries and departments, local communities, NGO, project owner, developers, donor agencies, researchers, affected families, contractors and consultants are the key stakeholders in hydropower development. The compensation fixing committee (CFC) is appointed to fix the compensation amount and to resolve the conflicts regarding the compensation. Environmentalist role is mainly in environmental management in planning and implementation and operation stage. The role of project owner is to acquire all necessary land and buildings before the commencement of the construction works. The role of contractors in implementation phases are construction of project features, correct disposal of surplus in designated areas, rehabilitation of trees and shrubs etc. In operation phase, environmentalist monitors the landslides and slope stability, river bed degradation etc. Donor agencies provides the financial support to the project in terms of loan, donation etc. These stakeholders are involved in either in decision making, planning and detailed feasibility study, implementation or in operation phase (NHA, 2009).

2.5. Land Tenure For Social and Environmental Effects

This section identifies the various social and environmental effects and described in the following subsections.

2.5.1. Social effects

In Norway in Aurland hydropower project, the project owner distributes the benefits to the commune as a percentage of power output to use locally and sell on the open market for improving the livelihood of affected families. Furthermore, local communes can be shareholder of regional power companies profit and company itself (Anderssen, 1998). The land acquisition has social effects such as the change in income level of land owner, land ownership structure, cultural and social values and norms (Syagga & Olima, 1996). Another effect to the society during and after the construction of the projects is a mixing of outsiders– labourers and contractors in the area and this cause to the mix of the culture. Hydropower

development effects social, cultural and socio economic status of the affected people (Agrawal et al., 2010).

2.5.2. Environmental effects

The land acquisition for hydropower development has environmental effects such as change in land utilization and farming practices (Syagga & Olima, 1996). It is possible to have difference in productivity of land because of resettlement/relocation in different places which leads to change in land utilization and farming practices. Hydropower development effects in the landscape of the area. Development of infrastructure causes modernization of the area and cause degradation of the natural beauty of the valley. The chief implications of infrastructure projects are ecological interferences, reduction of biodiversity, reduction of productive lands and destruction of forests and dilapidation of natural resources. The project disturbs the river's key ecological processes because of change of flow of water during its development and effects the aquatic system of the river (Agrawal et al., 2010).

2.6. Summary

Hydropower development mainly involves political decision making, planning and feasibility study, design, implementation and operation stages. In political decision making, site selection is proposed based on land, hydropower and environment policies of the country. Land allocations are carried out in planning and detailed feasibility study stage. In implementation stage, land acquisition is carried out for the development of the project. Current hydropower development practice includes the participatory planning process. Private and public sector are involving in hydropower development. Current process of hydropower planning involves different stakeholders such as affected people, government etc.

Sound land administration and land tenure is very essential for the sustainable hydropower development because strong land tenure security always provides incentives for the investment in hydropower development. Land tenure improves transferability of land, greater investment incentive and more sustainable use and management of land resources.

Different countries have different land tenure forms based on the cultural, economic and political system of the country. Hydropower development is allocated in private land, state land, religious land and communal land. It is also allocated in agricultural, forest, pasture and barren land. Participatory land use planning is used for the hydropower development to minimize negative social and environmental effects.

Mostly, land is acquired either by compulsory purchase, voluntarily purchase and land consolidation for the hydropower developments. The concession is carried out for acquiring all the necessary rights requires for the hydropower development. Various land tenure stakeholders are involved during hydropower development with different roles in different stages of hydropower development. The claim, interest and expectation of the stakeholders should be considered for sustainable hydropower development.

In developing countries issues related with land tenure such as land tenure forms and its allocations, land acquisition procedure, identification of stakeholders and their roles is not focused in hydropower development plan. As a result, they face various obstacles during the hydropower development. The Aurland hydropower development in Norway is good example of hydropower development which has focused on land tenure in hydropower development plan and got success in its development. Therefore, it is essential to focus land tenure in hydropower development for its sustainability. The land acquisition has social and environmental effects such as the change in income level of land owner, land utilization, land ownership structure, farming practices, cultural, social values and norms.

3. ASSESSMENT FRAMEWORK FOR THE ROLE OF LAND TENURE

3.1. Introduction

In the second chapter, critical literature review was done to get theoretical overview of land tenure in hydropower development for social and environmental effects. The main objective of this chapter is to prepare the assessment framework for assessing the role of land tenure in hydropower development. Firstly, an assessment framework is defined to know the basic idea on an assessment framework. The need and importance of an assessment framework is highlighted after having the basic idea on assessment framework. The various approaches for an assessment has been reviewed to develop the assessment framework as it is difficult to find the appropriate approach for assessing the role of land tenure in hydropower development. An assessment framework for this research is developed in the subsection 3.2.3. Based on this framework scope, aspects and elements are identified for an assessment. Various strategies based on these elements, indicators from these strategies and good practices are the outcomes of this chapter. The summary is given at the end of the chapter.

3.2. Assessment Framework

This section defines an assessment framework and highlights the need and importance of an assessment framework. It also includes the various approaches for an assessment. The assessment framework for this research is developed based on these approaches which are discussed in the following subsections.

3.2.1. Definition, need and importance of an assessment framework

An assessment is the systematic collection, review and use of information for depth understanding from different sources (Palomba & Banta, 1999). Based on this definition of an assessment, an assessment framework is defined as the conceptual structure for the collection, review and use of information to guide the research orientation.

It is difficult to find the methodologies to assess the role of land tenure in hydropower development. Therefore, it is necessary to develop an assessment framework from scratch for assessing the role of land tenure in hydropower development. An assessment framework is very important to assess how issues related to land tenure and property rights (LTPR) are impacting success of hydropower development. An assessment framework provides guidelines and identify the aspects that should be considered in an assessment (Reijersa & Mansarb, 2004). An assessment framework finds the aspects that are to be expected and to be considered during an assessment process (Crisp et al., 2005). It shows that formulating assessment framework is essential to include, review and use core aspects. Land tenure assessment is required for determining the real cause of conflicts and also for the implementation of a plan and program to support local communities (Galudra et al., 2009).

3.2.2. Approach for assessment framework

Literature is reviewed to get an idea for developing an assessment framework to assess the role of land tenure in hydropower development. Some cases of an assessment approaches are found with their specific objective which are discussed as follows.

a) Comparative evaluation approach

At first goals are defined and the ways to get that goal in this approach. One or more qualitative and quantitative indicators for each goal are formulated and benchmark is developed for each indicator. Optimal benchmarks are developed as best practice (Bandeira et al., 2009). The overview of framework for this approach is given in the Table3.1.

Table 3.1.Evaluation Approach formulated by (Bandeira et al., 2009)

Goals	Indicators	Bench mark (% , yes, no, value)	Source
Goal 1	Indicator 1 for Goal 1	Benchmark 1	Best practice 1
	Indicator 2 for Goal 1	Benchmark 2	Best practice 2
Goal 2	Indicator 1 for Goal 2	Benchmark 3	Best practice 3
	Indicator 2 for Goal 2	Benchmark 4	Best practice 4
…….	……..	……	……

b) Logical framework matrix approach

In this approach, key elements of project are structured in a way to give target input, planned activities, and expected output and are interconnected logically (Groenendjik & Dopheide, 2003). It gives the basis for formulation of action plan and a framework for evaluation. The overview of the logical framework matrix approach is given in the Table 3.2.

Table 3.2.LFA approach for evaluation by (Groenendjik & Dopheide, 2003)

Intervention logic	OVI	Mov	Assumption
Purpose	Purpose OVI	Purpose Mov	Assumption
Output	Output OVI	Output MoV	Assumption
Activities	Input	Budget	Assumption
			Precondition

c) **Good practice criteria approach**

This approach of evaluation consider the evaluation area, aspects, indicators and good practice criteria for the evaluation (Steudler, 2004). The overview is shown in the Table 3.3. For each indicator, good practice criteria are developed for the evaluation.

Table 3.3.Good practice criteria approach by (Steudler, 2004)

Evaluation Area	Aspects	Indicators	Good Practices
Policy level	Relevant Aspects	Relevant indicators	Good practice for each indicators
Management level	Relevant aspects	Relevant indicators	Good practice for each indicators
…….	……..	…….	……

3.2.3. Comparison of Evaluation Approaches

An approach followed by (Steudler, 2004) involves mainly policy level, management level and operation level as an evaluation area. The central elements defined for the evaluation is the integrated form of objective, strategy, outcomes and indicators and result evaluation. These elements are correlated with the various evaluation areas whereas LFA approach is widely applicable in evaluation of LAS project of international donor. Many donors such as World Bank and Asian Development Bank (ADB) request the application of it in project proposal and reports. An approach used by (Bandeira et al., 2009) for evaluation of national LAS followed the goal concepts (Table 3.1). By comparing the characteristics of each approach it is found that no any approach can be perfectly used for the assessment of role of land

tenure in hydropower development which considers the evaluation areas as the political decision making, planning and feasibility, design, implementation and operation stage.

3.2.4. An assessment framework for the research

An assessment framework for this research is more influenced by the idea of (Steudler, 2004) and (Bandeira et al., 2009). The Figure 3.1 gives an overview for an assessment of role of land tenure for this research. Based on the scope of an assessment, various aspects; elements are identified for an assessment. Scope in an assessment is the evaluation areas that provide reference for the assessment framework. The aspects are the breakdown of these evaluation areas. The elements are the smaller units of aspects for an assessment. Based on these elements strategies are developed by strength, weakness, opportunity and threat (SWOT) analyses. The strategies are the way to achieve the objective and indicators are measurable variables such as types, number of stages, percentage of respondents etc. and are developed based on the strategies. Good practices criteria are optimal performance of indicator and are developed from the literature review. Indicators and good practice criteria are the methods to assess the role of land tenure within the scope.

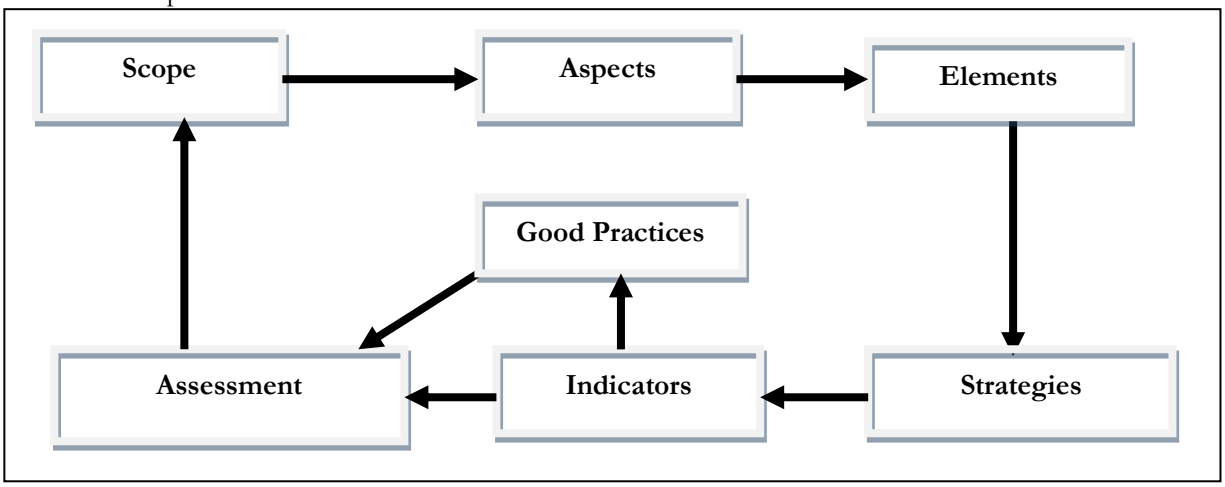

Figure 3.1.An Assessment Framework

3.3. Scope, Aspects and Elements for an Assessment

This section explains about the scope, various aspects and elements used in assessment framework for the role of land tenure in hydropower development in the following subsections.

3.3.1. Scope

Determining the scope of an assessment within the framework is very important to know the extent up to which an assessment has to be conducted. As discussed in the subsection 2.2, chapter 2, the key stages of hydropower development is political decision making, planning and feasibility study, design, implementation and operation. These entire stages are referred as scope for an assessment because these are the evaluation areas and covers entire extent of hydropower development i.e. site selection to operation of hydropower plant. These stages correlate from policy making aspects to impact aspects respectively. Furthermore, consideration of all aspects in these stages of hydropower development supports for the sustainable development of the projects.

3.3.2. Aspects and elements

Policies, Governance, Tenure and rights on land, Threats and power degree, land acquisition are the major aspects for assessing the role of land tenure as reviewed from (Galudra et al., 2009). External factor and impact are also the key aspects for the assessment in Land Administration System (Steudler & Williamson, 2005). These aspects are chosen for the assessment in this research because these aspects have correlation

with the scope of hydropower development. The stakeholders' capacity and expectation are the external factors whereas social and environmental effects and stakeholders' satisfaction are the impacts.

All of these aspects are further breakdown into various elements for the assessment. The elements for the assessment are developed from common understanding and experiences of land tenure in hydropower development of various countries (Chapter 2, Section 2.4). The following elements are key elements considered for an assessment because an experience of land tenure (Chapter 2, Section 2.4) indicates that hydropower projects are not sustainable due to lack of consideration of these elements in hydropower development plan. These aspects and elements are mentioned as follows.

a) Policy aspect

Policies are one of the important aspects to be considered for the assessment. Land policy, hydropower policy and environmental policy are required for political decision making process during site selection in hydropower development. Policy formulation approach, access to land, equity in access to land and sustainability are the key elements under this aspect considered for this research based on (Galudra et al., 2009) which are discussed as follows.

- **Policy formulation approach**

Policy formulation approach can be bottom up, top down or mixed. Bottom up approach of policy formulation is a good practice because it includes all the stakeholders' participation to include their expectation, claim and interest. This supports for smooth development of any hydropower project which ultimately benefits the society.

- **Access to land**

It is important to know how the affected people hold the land by tenant or land owner or combined. The way of getting land by them is another issues related to access to land to be known during the assessment to identify the socioeconomic status of the affected people.

- **Equity in access to land**

It is included as key element in policy aspect because provision of equity in access to land is necessary in order to avoid the discrimination between men, women, ethnic groups, poor and rich people. Equality of access to land resolves land conflicts so that hydropower development is sustainable. The sustainable development of the project provides the benefits in terms of employment and services.

- **Sustainability**

Environmental, social and economic balance creates the sustainability of the hydropower project. In order to achieve this, there should be minimum negative social and environmental effects by hydropower development. Mitigation measures should be applied for minimising the effects. Hence, it is considered as one of the elements in policy aspect.

b) Governance aspect

Governance principles are equally important in every stages of hydropower development. Elements correlated to governance principles such as public participation, access to information, transparency, accountability, rule of law etc. are reviewed in (Zakout et al., 2006). This research includes only transparency, public participation and access to information as key elements in this aspect for the assessment since these are more focused on research sub question (Chapter 1, Section 1.5.) and are discussed as follows.

- **Public participation**

Public participation makes the stakeholders feel respected based on their right and be more co-operative which helps in resolving land conflicts. It helps to get sustainable decision on different issues such as

boundary dispute between people or community. The consensus is achieved between parties by public participation for minimising the conflicts for sustainable development of the project.

- **Access to information**

Access to information creates greater transparency and fewer opportunities for bribery (Zakout et al., 2006). It is essential to identify that whether access to information is easy to the stakeholders or not. So, it is included as elements in an assessment. Access to information to all the stakeholders resolves the conflicts which ultimately supports for development of the project

- **Transparency**

Transparency is necessary to build the trustworthy among the project developers and the affected families for smooth running of the project. It can be achieved by broader participation of stakeholders and access to information.

c) Tenure and rights aspect

Since tenure forms and its allocation as discussed in chapter 2 are linked with planning stage, tenure and rights aspect is included in the assessment framework. Forms of rights, ownership, land use are the key elements that are included in this aspect which are mentioned as follows.

- **Forms of right**

Rights such as freehold, leasehold etc. are exercised in hydropower development. Since the sustainable development of the project depends on the types of right they exercised during hydropower development, it is incorporated in an assessment framework.

- **Ownership**

Huge interference of land for hydropower development may include state land, private land, communal land and religious land. In order to determine which type of land is more suitable for hydropower development, it is included for an assessment as an element. Development of hydropower project in these lands has direct or indirect social effect.

- **Land use**

It is included as an element for an assessment because lands use planning support to resolve land conflicts and to conciliate interest by agreement to guarantee the sustainability of the land resources. It provides the prerequisites for attaining sustainable form of land use (GTZ, 1999).

d) Land acquisition aspect

Land acquisition is interconnected to implementation stage of project development and is the challenging task in project development. It is important to find the appropriate land acquisition procedure for hydropower development. Land resettlement and compensation are the key elements in this aspect and described as follows.

- **Resettlement/Relocation**

Resettlement/relocation is to be carried out for land acquisition during hydropower development. It is essential to know how and where resettlement has been carried out to the affected families. Therefore, resettlement/relocation is one of the main elements in this aspect. Resettlement in forest land causes the loss of trees and vegetation. The change in farming practice and land use occurs because of the resettlement without comprehensive planning.

- **Compensation**

Considerable, fair and timely compensation plays vital role for resolving land conflicts and supports to complete the project within stipulated time. Land to land and land to cash compensation can be carried out during the development. Full compensation at once or at instalments payment is possible for the acquisition of land.

e) Threats and power degree aspect

Land conflict is the element for an assessment interconnected with threats and power degree aspect (Galudra et al., 2009). Boundary conflicts, conflicts caused by unfair compensation, untimely compensation, land use conflicts such as conflicts caused by blasting, movement of heavy equipment are the major conflicts in hydropower developments. In order to resolve this conflict, it is necessary to assess land conflict as a key element.

f) External factor aspect

External factor is essential aspect for the assessment because this aspect includes the stakeholders' capacity for the investment, stakeholder expectation and their skill for the development of the projects. The priority should be given to the stakeholders because they are involved in all stages of hydropower development. Each element under this aspect is described as follows.

- **Stakeholders' capacity**

An assessment of stakeholders' capacity for the investment is essential to encourage investors at local level. They can share the benefits from hydropower development if their maximum capacity is utilised for the project development.

- **Stakeholder expectation**

It is essential to determine stakeholders claim, interest and expectation for the sustainable hydropower development. This element is required for the assessment to identify that whether these expectations are attainable or not by the project.

g) Impact aspect

Impact aspect is included in the assessment framework since the overall concern of hydropower development is to evaluate the social and environmental effects. It may be positive impact or negative impact. Improvement of socioeconomic environment, stakeholders' satisfaction and improvement of biological environment are the main elements under this aspect which are discussed as follows.

- **Improvement of socioeconomic status**

The main objective of hydropower development is to improve the socioeconomic environment of the affected families by providing basic facilities such as access road, access to land, electricity etc. It is essential to include it as an element to identify the status of socioeconomic status.

- **Stakeholders' satisfaction**

It is considered as an essential element for an assessment since the sustainable development of any hydropower projects depends on the satisfaction level of stakeholder (GTZ, 1998).

Improvement of environment

Hydropower development should be environmental friendly. It should have minimum negative effect on the environment. Mitigation measures are essential for deforestation by hydropower development. It is included as an element in an assessment to identify improvement of biological environment by the

development of the project. The overview of aspects and elements followed for this research based on scope is given in the Table 3.4.

Table 3.4.Scope, Aspects and Elements for an assessment

Stages/Scope	Aspects	Elements
Political decision making	Policies: Land, hydropower and environmental policies	Policy formulation approach, access to land, equity in access to land & sustainability
	Governance	Public participation, access to information & transparency
Planning and feasibility study	Tenure and rights on land	Forms of rights, ownership & Land use
	Governance	Public participation, access to information & transparency
	External Factors	Stakeholders expectation
Design	Governance	Public participation, access to information & transparency
	External Factor	Stakeholders expectation
Implementation	Land acquisition	Resettlement and compensation
	External Factors	Stakeholders capacity & stakeholder satisfaction
	Governance	Public participation, access to information & transparency
	Threats and power degree	Land conflicts
Operation	Impact	Improvement of socioeconomic status and biological environment & stakeholder satisfaction
	Governance	Public participation, access to information & transparency

3.4. Strategies, Indicators and Good practice for an Assessment

This section mentions about the strategies and its formulation, indicators and good practice criteria in the following subsections.

3.4.1. Strategies

Strategies are used as goals because these are formulated to define the way to fulfil the objective for sustainable hydropower development having minimum social and environmental negative effects. It is the basis to formulate the indicators. There are various methods for formulating strategies some of them are described as follows.

a) Balanced score card

This method of strategy formulation includes four dimensions such as the customer perspective, internal perspective, innovative perspective and financial perspective. The customer perspective focus on how should they focus on their customers? Internal perspective considers which business should they be good at? Innovative perspective raises issues how will be sustain their ability to learn and improve? And to be successful, final perspective considers how should they appear to those who provide them financial resource?

b) Strategic grid

This method uses combinations of two dimensions in grids. This method aims at differentiating and clustering actors, phenomena and attributes based on certain characteristics.These differences can help in formulating different strategies for each cluster of actors, phenomena and attributes.

c) SWOT analysis

SWOT analysis is commonly known for the situation analysis within the strategic planning process. The situation analysis is the way of identifying strategic fit within internal strengths and external opportunities while working on internal weakness and external threat (Groenendjik & Dopheide, 2003). Through it, an organisation can recognize strength, weakness, opportunities and threats. The weakness is those things that need to be improved, those are being done wrongly or those should be avoided. Strength are market

advantages of the organisation or those things that it does good from both the perception of organisation and that of people it deals with. Threats are an external factor that has substantial negative effects on an organisation performance. An opportunity is an external fact or development that, if taken advantage of can substantially contribute to realisation of organisation's goal (Groenendjik & Dopheide, 2003).

The strategies in this research are developed by SWOT matrix method because it is easy, flexible and basic tool in the strategic planning process comparing to other methods such as balanced score card and strategic grids. Here, the internal factor is considered as the organisations weakness and strength whereas the external factors are the opportunities and threats determined by external scanning. Stakeholders, funding agencies etc. are the external environments of hydropower organisation. Strength, weakness, opportunity and threats are developed based on the various elements (Table 3.4). The SWOT matrix is represented in the Table 3.5 and matches external and internal factors.

Table 3.5.SWOT matrix

Internal Factors	**Strength** -Improvement of land tenure security by land registration -Upgrading of Land tenure. -Improvement livelihood of people	**Weakness** -Manage all types of land required for hydropower development. -Relocation/Resettlement of the affected people -Provision for access to information to affected people. -Implementation of good practice
External Factors	**Opportunity** -Public awareness can be increased -Right to access land can be increased - Equity in access to land	**Threats** - Stakeholder's satisfaction - Cooperation and coordination with funding agencies - Identifying various land conflicts - Sustainable hydropower projects - Better policy formulation. - Maintain properly the land records.

Table 3.6.Strategies from SWOT matrix

SO Strategies • Improve land tenure security. • Supporting tenure upgrading • Improve the right to access land • Improve equity in access to land • Improve living standards.	**ST Strategies** • Measure stakeholder's satisfaction level • Define clear role and responsibility of stakeholders • Involve local stakeholders and communities. • Cooperation with funding agencies.
WO Strategies • Increase public awareness and access to information • Apply suitable land acquisition and compensation procedure • Manage all land of project area. • Relocation/resettlement of the people by hydropower development • Provide information for affected people	**WT Strategies** • Maintain land records properly • Support land registration and land marketing system • Identify various land conflicts • Follow better policy formulation approach • Support sustainability

SO, ST, WO and WT strategies are mentioned in Table 3.6 formulated based on the SWOT matrix in the Table 3.5. The purpose of SO strategies is to use strengths for taking an advantage of opportunities. The

aim of ST strategies is to consider the strength as a way to remove threat in the environment. By overcoming weakness, WO strategies try to get an advantage of opportunities in an environment. WT strategies are basically defensive and primarily act to minimise weakness and avoid threats (Groenendjik & Dopheide, 2003).

3.4.2. Indicators and good practice criteria

The indicators are formulated to develop the household and interview questionnaire for the collection of data based on the strategies formulated in the Table 3.6. Optimal performance of the indicators is defined as good practice criteria. An assessment of the land tenure in hydropower development on defined indicator is used to compare to related good practice criteria. Good practice criteria for each indicator in this research are developed based on the experiences of land tenure in hydropower development in Norway as mentioned in section 2.4 and subsection 2.4.1 and literatures. The overview of aspects, strategies, indicators and good practices criteria are shown in the Table 3.7. Indicators and good practice criteria are the basis for the assessment.

Table 3.7. Strategies, Indicators and good practice

	Strategies/goals	Indicators	Good Practices
Policy	Improve equity in access to land	-Status of equity of land in project area.	-Equitable to all.
	Provide access to land.	-Number and ways of access to land	-All should have access to land and ways are based on the existing ground condition.
	Support sustainability	-Kinds of social, environmental and economic impact by the project.	-Socially, environmentally and economically feasible.
	Follow better policy formulation approach	-Types of land policy formulation approach	-Policy formulation is based on bottom up approach to incorporate interest of affected families
Tenure & right	Manage all ownership and use rights.	-Types of ownership and use rights in the project area.	- Ownership /use of land is based on the existing ground condition.
	Support tenure upgrading.	-Status of land registration certificate issued.	All rights are registered
	Improve land tenure security.	Status of legally recognized land rights.	
	Support land registration and land market system.	-Transactions status before and after implementation of the project.	-Transaction status is improved.
Governance	Increase Public awareness	-Stakeholder involved in awareness program.	-All stakeholders are participated in awareness program
	Improve public participation level	-Benefits of participation -Number of participation stage and respondents.	-Participation and benefits is ensured -The stakeholders' interest is well addressed in each stage of participation
	Provide information for affected people	-Access to information for affected people. -Source of dissemination of information.	-Access to information is easier for these people

			-More source is used for dissemination
	Involve local stakeholders and communities	-Types of people getting information easily.	-All stakeholders are timely and sufficiently informed about the project.
	Define role and responsibility of stakeholders	-Ways of involving stakeholders regularly in the project	Roles are well defined
Acquisition	Adopt suitable acquisition and compensation procedure	-Types of acquisition and compensation procedure. -Number of affected people -valuation procedures	-Method of land acquisition is commonly accepted in the context. -Less people is affected -Scientific valuation procedure is applied
Threats	Identify the various land conflicts	-Types of land disputes/conflicts in the project -Ways of resolving land conflicts	-Ensure minimum conflict -Mechanism for resolving conflicts is available.
External factor	Identify stakeholders expectation Build stakeholders capacity	-Various types of benefits that can be expected from the projects. -Types of employee in the project. -Types of training for the affected families -Stakeholder and their role	-Strategies for post construction benefits are available. -Use of local resources as far as possible. -stakeholders capacity is increased
Impact	Improve social and environmental conditions. Measure stakeholders satisfaction level	-Types of training carried out -Number of employed family members. -Effect on education by the project. -Status of access to basic facilities due to hydropower project in the area. -Types of family structure. -Satisfaction level in getting compensation and implementation of the project. -Types of mitigation measures	-Local resource is given a first priority. -Affected families income level has been improved. -Socioeconomic status of the affected families has been improved. -Affected families are satisfied with the procedure. -Mitigation measures is applied

3.5. Summary

This chapter dealt on developing an assessment framework for assessing the role of land tenure in hydropower development. An assessment framework is important because it provides guidelines and determines the aspects that should be focused in an assessment. Determining the scope of an assessment is essential to identify the extent up to which it should be carried out. Scope is considered as the evaluation area. Land policies, Land tenure and rights, Governance, threats and power degree, land acquisition, external factors and impacts are the key aspects for an assessment. Further aspects are breakdown into elements based on literature review and common understanding having correlation with aspects and scope of the assessment. Strategies are developed by SWOT matrix and are used as goals for an assessment which helped to formulate the indicators. Indicators are the key variables which supports in formulating the questionnaire. A good practice criterion is an optimal performance of indicators and is defined to assess the role of land tenure.

4. DATA COLLECTION METHODOLOGY

4.1. Introduction

In previous chapter, an assessment framework was developed for an assessment of role of land tenure. The main objective of this chapter is to describe the approach followed for data collection. At first case study area is introduced to justify its selection. The approach and structure followed for designing questionnaires to collect the data for case study is explained in the next section. After designing the questionnaire, this chapter mentions about preparation for data collection. The section 4.5 highlights about the various types of data collection methods. The ethical consideration and quality control during data collection is mentioned after the data collection. The challenges faced during data collection are the next content of this chapter. The data processing techniques for effective analysis of data are explained after the discussion of challenges faced on fieldwork and summary ends the chapter.

4.2. Introduction to Case Study Area

The case study was carried out in Upper Tamakoshi Hydroelectric Project (UTHEP) in Nepal. It lies in Dolakha district, Janakpur zone in central development region. It is located in the range of Himalayas, southern part of Lamabagar VDC, in Dolakha district. The project site is located in 86° 12' 00"easting and 27° 55' 00" northing at an elevation of 13402 ft .The dam site is at Lamabagar village, 100 km far from the Kathmandu, 8 km south of China border and 30 km north of district headquarter, Charikot. The project area is enclosed by longitudes from 86° 10' 00" to 86° 16' 00" and latitude from 27° 49' 00" to 27° 58' 00. The details of the case study area are shown in the Figure 4.1.

Figure 4.1.Case Study Area in Nepal

According to "Upper Tamakoshi Hydroelectric Project: An introduction", the publication of UTHEPL, it is the largest hydroelectric project in Nepal to date and highly attractive and low cost project. Amongst other hydroelectricity project in Nepal, Tamakoshi is the cheapest based on unit electricity product. It seems more beneficial environmentally and economically. The origin of Tamakoshi is from the glaciers. Therefore, it maintains the constant flow of water every month. The major developers are the Nepalese themselves; NEA, Employment provident fund, Citizen Investment Trust, Rastriya Beema Santhasan etc.

This project is selected for the case study because it is possible to analyse tenure forms and its allocation in its development. Since planning, design and construction of access tunnel of the project was completed, it is possible to assess the governance elements during these stages of the project. Based on detailed feasibility and EIA report, it is found that 90% of compensation work was completed for land acquisition. Therefore, the land acquisition procedure, compensation and its social and environmental effects after

changing the land tenure is assessed during project development. The various land tenure stakeholders and their roles are found out in this project. The other reason for the selection of this project is its special characteristics.

4.3. Designing Questionnaires

The approach for designing questionnaires and structure of household and interview questionnaires is mentioned in the following subsections.

4.3.1. Approach for designing questionnaires

The questionnaire is defined as a survey tool preferred to collect data from individuals or about a social unit i.e. household (Siniscalco & Auriat, 2005). The questionnaire can collect various types of information such as level of knowledge, expectations, opinions, activities etc. The questionnaire was oriented towards the objective of the research. Questionnaires were pretested to check the clarity and understability of the questions. By testing the questionnaires, time required to answer all questionnaires is also known which helped in preparing the field work plan. Questionnaire was tested with two affected families.

Before designating the questionnaires, an assessment framework as mentioned in chapter 3 was conceptualized. The indicators based on various strategies had been identified as mentioned in chapter 3. The questionnaires were developed based on those indicators for the collection of data.

4.3.2. Questionnaire structure

The structure of household and interview questionnaires is discussed as follows.

- **Household questionnaire**

The objectives of the questionnaire survey are mentioned in the questionnaire. It also contains household address, date of household questionnaire survey, location of conducting household questionnaire and the name of the interviewer. It contains closed (or multiple choice) questions and open-ended or free-response questions. While designating household questionnaire, it has been divided into following various sections (Appendix 3).

Section I: General introduction and socioeconomic status
Section II: Access to land
Section III: Land tenure issues
Section IV: Land acquisition issues
Section V: Land tenure stakeholders in hydropower development
Section VI: Public participation and access to information.

The sections I of the household questionnaire contain some introductory questions to the respondents and also consist of the questions to know socioeconomic status of the respondents. This section includes eight questions. Questions related to access to land is mentioned in the section II. It highlights on four questions. The section III mentions about the questions related to land tenure issue and involves five questions. Questions related to land acquisition issues were given in section IV containing six questions. The section V asks about the land tenure stakeholders and their roles and includes six questions. At the end of the questionnaire, questions related to public participation and access to information is mentioned with nine questions (Appendix 3).

- **Interview questionnaire**

All interview questionnaires contain interview number, date, interviewee name, interviewee position, organisation /department and contact information of interviewee. It includes objective for the interview and consists of open as well as close questions. It contains knowledge question and opinion/ experience

question. The details of the interview questionnaire structure for various key informants such as experts/academia, VDC heads, civil society members, UTHEPL officials, Survey official, Chief District Officer (CDO) and International Centre for Integrated Mountain Development (ICIMOD) official are mentioned in Appendix 4 to Appendix 14.

4.4. Preparation for Data Collection

Data needed for the research was identified as a preparation work. The fieldwork plan was prepared and the stakeholders were contacted before visiting to the case study area via telephone and emails. Various data collection methods were identified to collect the data. The list of potential respondents as individuals and organizations was prepared for interviewing. The support letter from ITC was prepared to request necessary help from an individual and organisations in Nepal for fieldwork. The consent form was prepared to maintain the ethical aspect of the research. Refinements in the household questionnaire were carried out after the pre-test and questionnaire was translated in Nepali. Before the household questionnaire survey an assistant was appointed to assist for the data collection in access road and powerhouse area. The selection of an assistant was based on his previous experience in conducting the household questionnaire. Necessary logistics was arranged before data collection. The detail description of the questions was explained and trained to an assistant for filling the answers in the questionnaire. The scale and time of the questionnaire was explained to him.

4.5. Data Collection

The main objective of collecting primary and secondary data is to get the empirical evidence to answer the research question and to achieve the research objective. The following subsections describe various methods for the collection of primary and secondary data.

4.5.1. Primary data collection methods

The various types of primary data collection methods used for this research are discussed as follows.

a) Household data collection

The main objective of the household data collection is to get information related with socioeconomic status of the respondents. The further aim is to know their views about the various land tenure issues related with the UTHEP. The researcher also went to working area in the site to collect data. Interviewers asked questions to respondents and filled themselves the answers as response by them.

The formula given by Glenn (1992) is used for sample calculation of the respondent for the household data collection because it is very simple to understand and to calculate the sample population comparing to Krejcie and Morgan's (1970) and Cochran's (1977) formula which use the concepts of t value, alpha level and margin of error for the calculation of sample size. Both Krejcie and Morgan's (1970) and Cochran's (1977) formula are reviewed from (Bartlett et al., 2001).

Therefore, by using Glenn (1992) formula
n = N / ((1 + (N*e ^2))
Where:
n = number of affected households for sampling
N = Total number of affected households by the hydropower project
= 276 (Source: Feasibility Study Report)
e = margin of error, When e=10%
n = 276 / (1 + (276*.1^2))
n = 276 / (1 + (276* .01))
n = 276 / (1 + 2.76)

n = 276 / 3.76
n=74
When e=5%, n= 163 and if e=15%, n= 38

10% margin of error is settled for sample calculation in this research. The reason to settle for 10% is that smaller the margin error, the larger the sample needed but the better the result is more credible. Because of time constraint and location of case study site, it is believed that e=10% (minimum 74 samples) is appropriate for the questionnaire survey.

Although oversampling can add cost to the survey, it is necessary to account for lost and uncooperative subjects (biasness) during questionnaire (Bartlett et al., 2001). Therefore, 100 samples of questionnaire survey were taken for the research although minimum 74 samples are required for the research.

b) Interviews

Interviews to the key informants as given in Appendix 1 were carried out to get the information /opinion on various aspects of the research during the fieldwork in Nepal. Interviews were taken to UTHEPL officials, experts/academia, hydropower professionals, environmentalist, official ICIMOD, Survey officer, civil society members, media person and VDC heads. Open and closed questions were asked to the interviewee during the interviews. Total 28 interviews with the key informants were taken during the fieldwork. Interviews were structured and semi structured type. The details about time, venue and list of interviewee for the interview are mentioned in Appendix 1. An audio recordings were done for interviews to review it at the time of data analysis and note was prepared during the interviews.

c) Participant observation

The compensation procedure held in UTHEPL site office near powerhouse is observed as a passive participant. It was carried out on 30th September, 2010 in UTHEP, site office at ward 6 in Lamabagar village. A short video recording was taken for the review of information during data analysis. The compensation was made with cash and bank cheques to the affected families. Compensation was done to affected families in presence of UTHEPL administrative staff, site incharge and former VDC head.

d) Field observation

The main objective of the field observation was to observe the site location of various components of hydropower project such as dam site, intake, desander basin, start point of headrace tunnel and access tunnel to reach to powerhouse site. The land use pattern in the area was observed by reaching to the site. The socioeconomic status of the affected families was observed during the site visit. Components of hydropower projects in the topographic maps and images were also verified during the field observation.

4.5.2. Secondary data collection

The methods for collection of spatial and non-spatial data are discussed in the following subsections.

4.5.2.1. Non spatial data

The document and video collection are carried out for collecting secondary non spatial data which are discussed as follows.

a) Document collection

The detailed feasibility and EIA report is collected to get information about the tenure forms and its allocations, land acquisition procedure, main land tenure stakeholders and their role in UTHEP. The property valuation report is collected to acquire information about valuation method applied to calculate damage and compensation amount for the acquisition of land. These data are collected from UTHEP

head office in Kathmandu. The land ownership data are also collected from UTHEPL head office for tenure mapping. Some publications such as "Upper Tamakoshi Hydroelectric project: An Introduction", "Hydro Nepal" and "Urja Nepal" were collected to get more information about the project from UTHEPL head office.

b) Video

One short (10 minutes) video that helps to know various land tenure stakeholders of the project was collected from UTHEPL head office in Kathmandu. It also gives background information for the hydropower development in Nepal and gives clear idea/information about this hydropower project. The video is available in Nepali.

4.5.2.2. Spatial data

The data collected were cadastral maps (analogue) from Survey office, Dolakha district, Topographic maps: analogue from ITC and digital from Survey Department Kathmandu, image, VDC map and district map in digital format from Survey Department in Kathmandu, hydropower development plan (Auto cad drawing) from UTHEPL head office in Kathmandu for the spatial analysis. The demarcation of the project component was done in the image /topographic map. The main purpose of collecting the cadastral maps and ownership data are for mapping land tenure of the project area. District map is used to show the project area and VDC maps are used to know the affected village by the project development. These are collected by reaching to the respected office during fieldwork in Nepal. The details of the schedule are mentioned in fieldwork dairy in Appendix 2.

4.6. Ethical Consideration and Quality Control

An ethical issue in the research can be seen as they relate to participants and researcher. With respect to participants, ethical consideration concerns on collecting information, seeking consent, maintaining confidentiality etc. Similarly, in context of researcher, areas of ethical concern include introducing bias, inaccurate reporting etc. (Kumar, 2005). All interviewee gave written permission to use the recorded material for the research purpose. The detail on consent for the permission of use is shown in Appendix 15. The researcher has not biased to interviewee in terms of gender during household questionnaire survey. It was also clearly instructed to an assistant during the data collection. The opinion from UTHEP officials about governance is cross checked with views of VDC heads and civil society members.

The questionnaire was translated in Nepali to make it understandable to the assistant and affected families. Consistency test is carried out to check the reliability of the data. The questionnaire was pretested to two affected land owners when they came in UTHEPL office for their official concern. The household questionnaire was cross checked after completing it in order to get completely filled questionnaire.

4.7. Challenges Faced on Data Collection

- **Accessibility**

The site is in remote area approximately 68 Km from the district headquarter. The researcher walked for five days in reaching and returning in/from the dam site from/to the district headquarter.

- **Lack of time**

In addition to the direct household questionnaire, because of lack of time, the researcher also took the opportunity to interview the affected families when they arrived for the collection of compensation. The researcher went to the place where the affected families were working in the projects.

- **Household data collection**

Since land issues are serious issue, the researcher spends more time to convince them about the objective of the research.

- **Interviews with informants**

Interview schedule could not be followed for conducting the informant's interview because of locations of site office and head office of UTHEP. Opinions of INGO/NGO are not incorporated in the research because involvement of INGO/NGO was not found at the time of visit to case study site.

4.8. Data Processing

The processing of data includes all operations undertaken from; when a set of data was collected until it was ready to be analysed either manually or by computer. The data processing begins with data editing, which is basically 'cleaning' the data by inference or by recall (Kumar, 2005). Data processing is very important for effective and efficient data analysis. The process undertaken for the data processing is mentioned in this section. Data analysis is discussed in next chapter.

a) Quantitative data processing

Quantitative data were obtained from structured interviews and closed questionnaire. These data were processed by using SPSS Software, version PASW Statistic18.0.2. Firstly, databases were created and coding was done to insert the data in database for the response collected from fieldwork. The various functions that are available in SPSS were used to analyse these data. To obtain the results in graphical form, Microsoft excel 2007 was also used for data processing.

b) Qualitative data processing

Qualitative data were obtained from literature review, semi structure and open ended questionnaire, open interviews and video. These data are processed manually to make usable for the analysis as the size of data is manageable. All interviews recording were carefully listened and noted down the required information in the notebook to use it for data analysis in chapter 5. The spatial data is processed by using Arc map version 10 and Auto Cad 2009 by using its tools. Hydropower components are processed in Auto cad as it is collected as secondary data and available in cad drawing format.

4.9. Summary

The chapter dealt with various data collection methodology followed in case study area. The case study was carried out in Upper Tamakoshi hydroelectric project in Dolakha district of Nepal. For the primary data collection, questionnaires for household and interview were designed. Questionnaires contain open as well as close questions. Various method of primary and secondary data collection such as interviews, household data collection, participant observation, field observation and document collection are used during fieldwork to collect spatial and non-spatial data. The cadastral maps and ownership data were collected for land tenure mapping. Topographic maps and image were used for field verification. As the quality control of data, an assistant was trained to fill the questionnaire. He was well instructed and explained about the questionnaire. An ethical aspect to be maintained during the questionnaire survey was also discussed with an assistant. The time and scale of the questionnaire is well explained to the assistant. Cross checked were done to have completely filled data and ethical aspects were maintained during the fieldwork. The consent for the use of recorded material had been taken with all the interviewee to show and use the recorded material for the research purpose. Various types of challenges were faced during the fieldwork such as accessibility and lack of time. Challenges were also faced during household data collection and interviews. The qualitative, quantitative and spatial data processing is very essential for efficient and effective data analysis before analysing the data and is carried out manually and digitally respectively.

5. DATA ANALYSIS AND ASSESSMENT

5.1. Introduction

The previous chapter was about data collection methodology. The main objective of this chapter is analysing the data and use the results to assess the role of land tenure in UTHEP based on indicators. The methods for data analysis and assessment are discussed before analysing the data. At first the data is analysed based on secondary data focusing on tenure forms and allocations, land acquisition, stakeholders and their role. Various indicators as formulated in chapter 3 are mentioned for the result of primary and secondary data. Then, data analysis based on primary data is mentioned in the next section. An assessment is carried out based on result of both primary and secondary data on the basis of an assessment framework developed in chapter 3. The summary is presented in the final section of the chapter.

5.2. Method for Data Analysis and Assessment

This section is again divided into two subsections as follows.

5.2.1. Method for data analysis

The basis for data analysis has been chosen as the same way that data was collected during fieldwork. As the project has already been in construction phase, firstly secondary data was collected during fieldwork. The content analysis is done for analysing the secondary data based on indicators. It has been analysed based on land tenure forms and allocations, land acquisition, land tenure stakeholders and their role.

After analysing the secondary data, primary data collected from different methods (Subsection 4.5.1, Chapter 4) are analysed by various analysing methods based on indicators. The spatial data is analysed by using Arc map version 10 and Auto cad 2009 by using its tools. Quantitative data collected from household questionnaire are analysed by using SPSS, Version PASW Statistic18.0.2 and Microsoft excel version 2007. Qualitative data obtained from interviews, participant observation, field observation and videos are analysed manually since it is manageable in size.

5.2.2. Method for an assessment

An assessment of role of land tenure in UTHEP is carried out based on an assessment framework as discussed in chapter 3. The indicators and good practice criteria are the assessment methods used for the assessment in the research as mentioned in chapter 3.

5.3. Result of Data Analysis

The following subsections discusses on the data analysis on the basis of secondary data such as detailed feasibility and EIA report, property valuation report and publications as mentioned in subsection 4.5.2 in chapter 4.

5.3.1. Result from secondary data

This subsection is discussed on the following headings.

5.3.1.1. Tenure forms and land allocations in UTHEP

The results are discussed on the basis of indicators such as types of ownership and use in the project area. (Table 3.7: Land tenure and right aspect).

Based on feasibility study report of UTHEP, UTHEP is allocated in private land and state land (government and public land). Although there are two Buddhist *Gumbas* in Lamabagar, the hydropower project does not have major effects on these religious lands. The present tenure forms within the headwork and power house area of the project are given in the Figure 5.1.

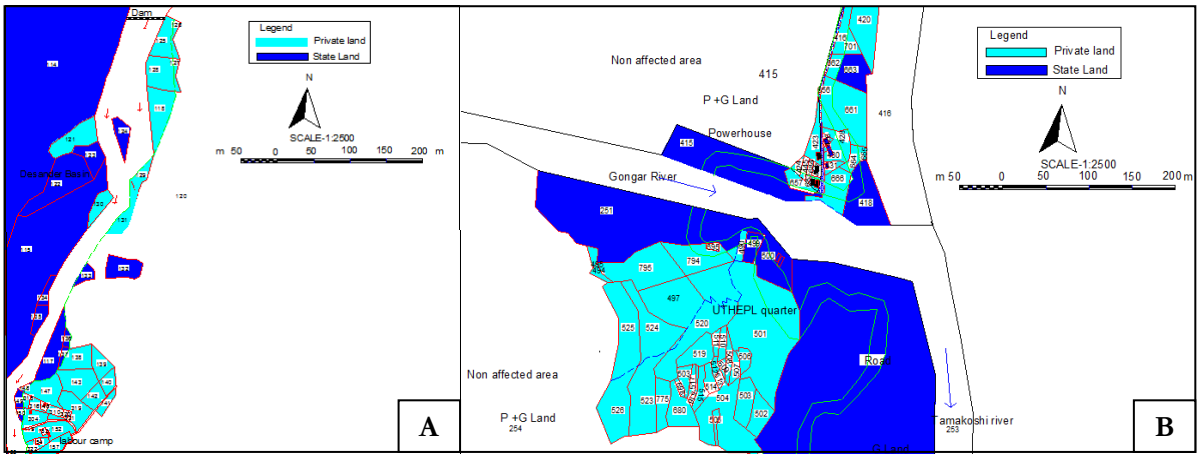

Figure 5.1.Tenure forms in the (A) headwork and (B) power house area

The total 45 hectares of private land is allocated for the project as mentioned in the Table 5.1. Since the project site is in hilly remote area, more settlements don't exist within the project area. Therefore, more government land is allocated for the project. In comparisons to headwork, camp site, powerhouse and spoil bank, access road is allocated more in private land. The details of private land such as *Khet, Bari* and *Kharbari* allocated for various component of UTHEP is shown in Table 5.1.

Table 5.1.Private land allocated for the project (Source Feasibility & EIA Report, 2005)

Project Sites	Affected Land(ha)					
	Khet	***Bari***	***Kharbari***	**others**	**Total**	**Percentage**
Headworks	0	9	0	0	9	20
Camp Site	1	3	1	0	5	11
Access Road	4	24	1	0	29	64
Power House	-	2	-	-	2	5
Spoil Bank	-	-	-	-	-	-
Total	5	38	2	0	45	

Similarly, the project is allocated in agricultural land, forest, cliff and barren land. According to the Table 5.2, total 182 hectares of land is allocated for the UTHEP. Out of which 66 hectares is agricultural land, 78 hectares is forest land and remaining 38 hectares is barren/cliff land. More forest land is allocated comparing to agricultural land because the project is in hilly area and consists of only few agricultural lands. The details of land allocated for the various project components is mentioned in the Table 5.2.

Table 5.2.Land allocated for project component of UTHEP (Source: Feasibility study &EIA Report, 2005)

Project Component	Land Types			Total Land Allocated
	Agriculture land	Forest Land	Cliff/Barren Land	
Headwork (reservoir, Intake, Desander) and powerhouse+ Adit	17	33	5	55
Quarry Area	-	1	4	5
Camps	10	6	3	19
Spoil	10	2	4	16
Access Road	29	36	22	87
Sub- Total	66	78	38	182
Total				182 ha

The project features of UTHEP such as dam, desander, headrace tunnel, penstock tunnel, power house etc. occupies 30% of the allocated land and access road covers 48% of the allocated land. It is found that access road covers more land than that of actual project features as mentioned in the Figure 5.2. It is because the access road corridor covers approximately 68 Km from Charikot - Singati while upgrading and Singati –powerhouse-dam site during construction of new access road.

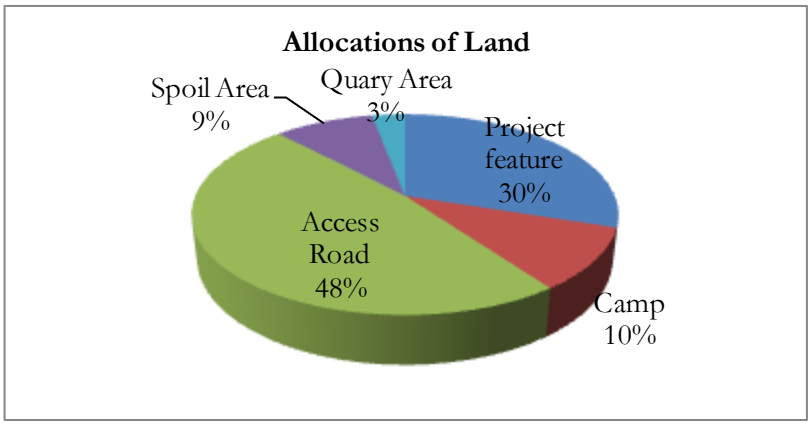

Figure 5.2.Land allocated based on project feature

The land use change is basically due to allocations of land for project structures, facilities and reservoir area. Land use changes occur along the access road and in Lamabagar VDC where the project structures are allocated. The change in land use pattern mostly occurs along the road corridor in 9 VDCs. The permanent land use change results in permanent loss of production resource base particularly of the cultivated land, private forest and grassland. The present land use pattern in the headwork and powerhouse area is as shown in the Figure 5.3.

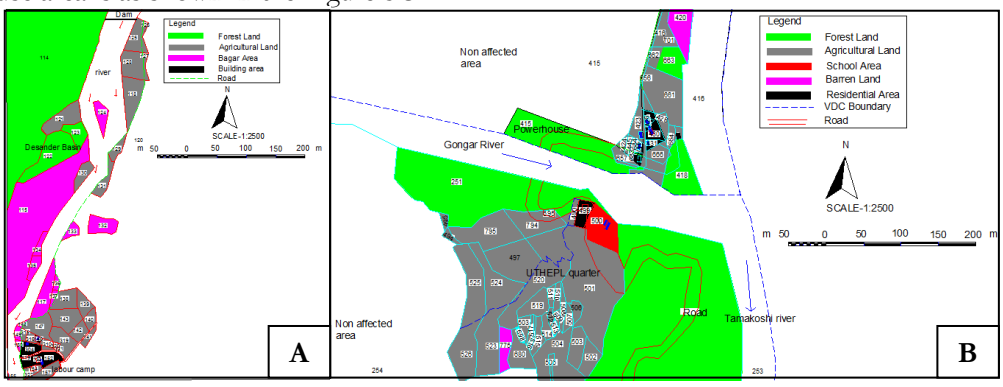

Figure 5.3.Land use pattern in (A) headwork and (B) power house area

The major component of UTHEP includes dam, desander (desilting basin), headrace tunnel, penstock tunnel, powerhouse, tailrace tunnel and transmission line. In analysing the Figure 5.4, it is found that settlements in the headwork area are very few comparing to powerhouse and tailrace tunnel area. The special features of UTHEP component are as follows.

- Access road: new construction- 28.65 km, upgrading- 33.0 km
- Diversion structure: dam height-15 m from river bed, length-60 m
- Settling basin: number of units- 2, length and breadth-246 m * 26 m, particle size to be settled- 0.15 mm
- Reservoir: surface area covered- 21.3 ha, live storage-790000 m^3
- Headrace tunnel: shape of tunnel- horse shoe shape, diameter-5.82 m, length -7170 m
- Powerhouse: type underground, floor area -112 m*12.9 m, power house height -29 m
- Turbine: number of units - 4, design discharge – 4 * 11m^3/sec.
- Tailrace tunnel: length- 2500 m
- Power: design gross head – 820 m, design net head – 806 m

The detail layout of UTHEP and settlements in the project area is given in the Figure 5.4.

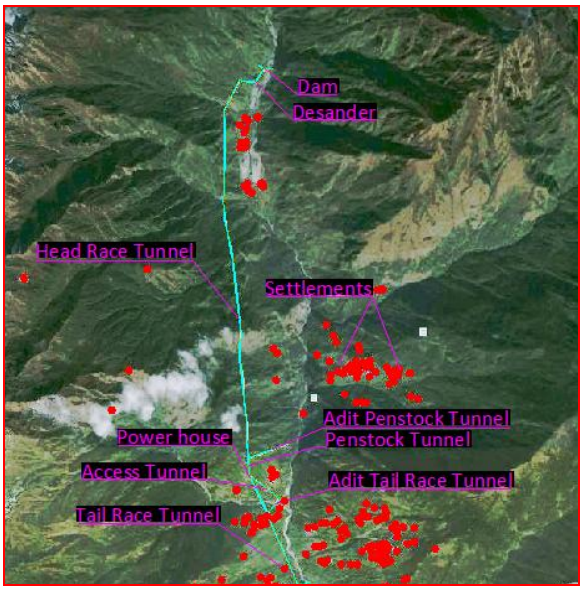

Figure 5.4.Layout of UTHEP features

5.3.1.2. Land acquisition for UTHEP

The results are discussed based on the indicators such as types of acquisition and compensation procedure, stakeholders involving in the procedure, number of household affected, relocated, number of affected VDC, and methods for valuation (Table 3.7: Land acquisition aspect).

Land is acquired by the compulsory purchase in UTHEP. As there are several political, local and social problems regarding land acquisition in UTHEP, progress of access road construction is below expectation (NHA, 2009). From the report, it is found that UTHEP forms the compensation fixing committee (CFC) which consists of the CDO, Chief District Land Administration and Revenue Office, Project chief or an officer designated by the CDO and the representative of the district development committee (DDC) to decide the amount of the compensation. Based on property valuation report, it is known that they compensate for damage of crops with the rate from district agricultural development office. For trees and bamboo they calculate the lump sum value.

According to the feasibility study report, from the past experiences of similar projects, the appropriate method of compensation in rural Nepal is the land-for-land compensation for the affected households. However due to land scarcity and steep terrain, it is difficult to find agricultural land around Lamabagar area. Under these circumstances a fully-fledged relocation plan is not developed in this project. Therefore, the land-for-land compensation method encounters numerous hurdles in terms of general applicability in the project area. So, for this type of scenario, cash compensation is done in the project.

A total of 276 households are affected by the project. Out of 276 households, 14 families are relocated and the rest lose some or all of their land and property. Most of the project affected families (PAF's) are *Tamangs* and *Gurungs*, followed by other ethnic groups like *Chhetries*, *Brahmin*, *Sherpa* and *Newar*. Occupational castes like *Kami, Damai,* and *Sharki* also exists in the project area. According to GoN classification, there are approximately 10 indigenous ethnic groups in UTHEP area. Among them the majority groups are: *Sherpa*, *Gurung*, *Newar*, *Thami*, *Jirel* and occupational caste groups like *Damai*. *Kami* and Sarki. 15 *pakki* houses are acquired for the project and one school is relocated. The total number of the households per project component affected by the UTHEP is given in the Table 5.3.

Table 5.3.Affected households by the project (Source: Feasibility study & EIA Report, 2005)

S. No.	Project Sites	Project Affected families		Seriously Affected Families	
		Number of Households	Total Population	Number of Households	Total Population
1	Head Works	10	47	0	0
2	Camp Site	17	82	0	0
3	Power House	9	42	11	53
4	Access Road	165	795	10	45
5	Spoil Bank	22	103	0	
6	Quarry Area	32	160	0	
Total		255	1229	21	98

The project affected area covers ten VDCs and one municipality. Among the affected VDCs/municipality, four VDCs and the municipality namely: Suspachhemawati, Sundrawati, Sunkhani and Orang VDCs and Bhimeshwar municipality are affected by upgrading of the existing district road. The new access road is constructed in Gaurishankar, Khare, Laduk Lamidanda and Bulung VDCs and the entire project structures are constructed in Lamabagar VDC. as shown in the Figure 5.5

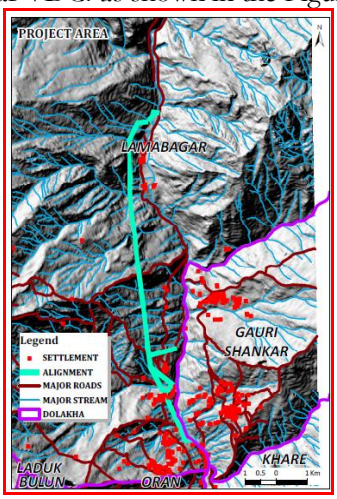

Figure 5.5.Affected VDC by the project

5.3.1.3. Stakeholders and their role

The results obtained from secondary data are discussed on the basis of indicators such as stakeholders and types of role (Table 3.7: external factor aspect). Based on the feasibility study report, NEA, UTHEP, financing institutions, consultants, contracting companies, developers/investors, environmentalist, NGO/INGO, DDC, CDO, CDA, Revenue officer, Upper Tamakoshi Environmental management unit, Ministry of Water Resource (MoWR), Department of Forest (DOF), Department of Electricity Development (DOED), engineers, sociologist, experts are the key stakeholders in UTHEP. CDO, Chief District Land Administration and Revenue Office, Project Chief or an officer designated by the CDO and the Representative of the DDC have important role in making decision for the compensation amount as a compensation fixing committee body. MOWR, DOF, DOED are the government bodies having role on making and maintaining in hydropower policy. District survey office, Dolakha has role of identifying all land owners and land areas of parcel numbers affected by the project and preparation of cadastral maps. The cadastral surveyor from the District Survey Office has role for exact quantification of the land area belonging to each of the land owners and tenants. Contractors and consultant have their responsibility for executing construction works. These stakeholders are involved in minimizing major land conflicts caused by blasting, vibration, construction equipment, compensation, valuation, unplanned disposal of construction spoils in the river, influx of the people and sanitation from labour camp in one way or other. These stakeholders have their role either in decision making, planning and feasibility study, design and implementation and operation stages of project development.

5.3.2. Results from primary data

The results obtained from household questionnaire, interviews, field observation and participant observation are discussed in this section under different headings. Eighty five household samples are taken for the analysis out of hundred household samples although the minimum required household sample is seventy four as calculated from formula (Chapter 4, Subsection 4.5.1). Eighty five household samples are selected for the analysis depending on the relevancy of the answers collected during household questionnaire. Some samples seem to be biased that inhibits the impartial judgment.

5.3.2.1. Household Socio economic status

Household socioeconomic status data are collected by questionnaire survey, interviews and field observations as follows. The results are based on the indicators such as types of family structure, number of employed family members etc. (Table 3.7: Impact aspect).

a) Results obtained from household questionnaire

It is found that 81% of the respondents are male and 19% respondents are the female during household data collection as mentioned in the Figure 5.6. The male respondent is higher comparing to female respondents because the family structure in the project area is male dominated. However, different groups of women are also active within the project area to enhance social development and awareness program of the project.

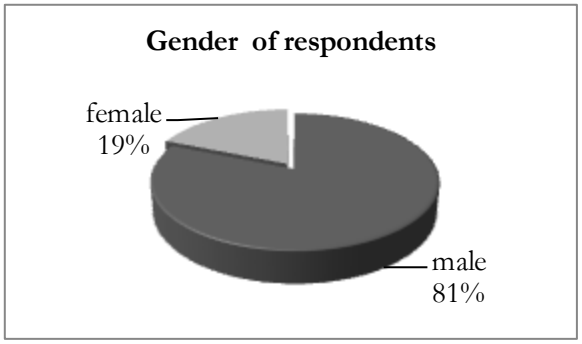

Figure 5.6.Gender respondents

From the household questionnaire, it is found that 14.1% of the respondents has total 4 family members, 30.6% of the respondents has 5 and 6, 4.7% has 7, 12.9% has 8 and 2.4% of the respondents has 9, 13 and 15 family members as shown in the Figure 5.7. It shows that 61% of the respondents have 5.5 family members. As shown in the Figure 5.8, 44% of the respondents have no employed family member. According to them, their main occupation is farming. It is found that 1% of the respondents have two employed family member. Those who are employed mostly works on the UTHEP. It reveals that they are getting opportunity of employment in the project.

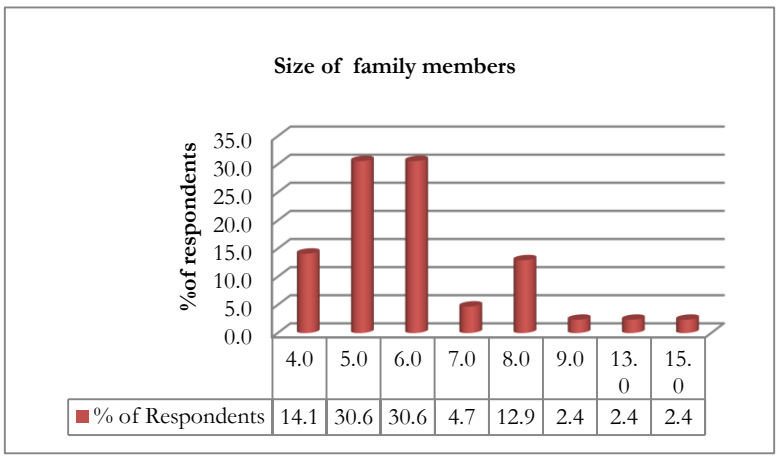

Figure 5.7.Number of family members in household

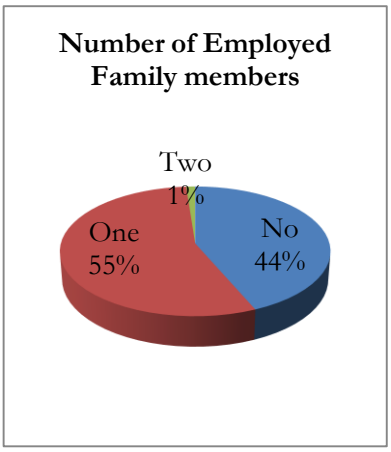

Figure 5.8.Employed family members in household

On asking about the improvement of livelihood of the respondents by the projects, it is found that 21% of the participants highly agree that project improves the livelihood of them and 74% of the respondents agree that livelihood of them is becoming better as shown in the Figure 5.9. The result shows that almost all respondent gave positive response on it. The reason for such result is that UTHEP is upgrading the road from Dolakha to Singati and constructing new road from Singati to Lamabagar. It launches the social development program to promote the livelihood of the affected families. According to respondents, livelihood of them is becoming better because of employment in the project. Similarly, on asking about the project for supporting education, 38% of the respondents highly agree that the project supports for the education. Similarly, 55% of the respondents agree that the project supports for the education in the project area as mentioned in the Figure 5.10. According to the respondents, UTHEP is supporting the affected people by supporting school as part of social development program.

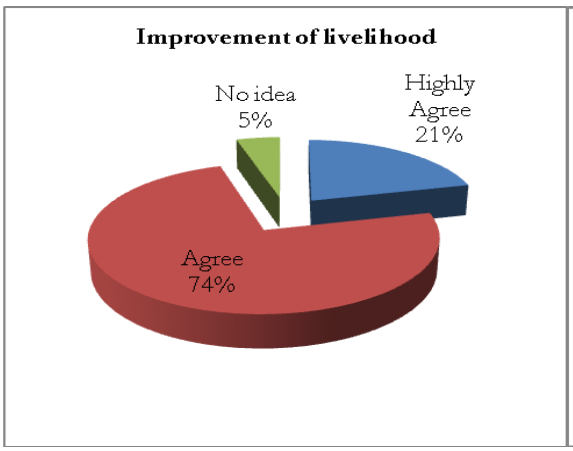

Figure 5.9.Views on improvement of livelihood

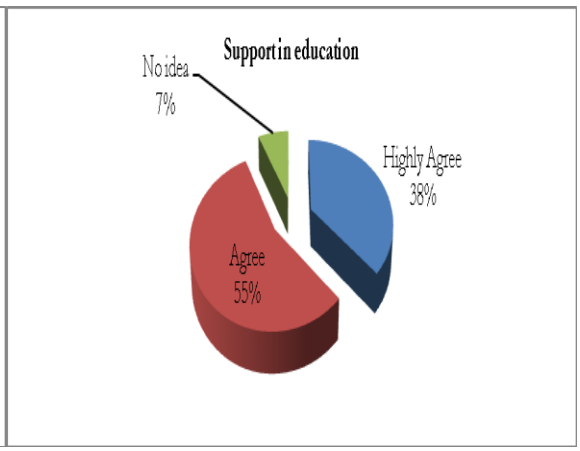

Figure 5.10.Views on supporting in education by project

All respondents have their access to road facilities. 29.4% of the respondents states that the project supports for electricity from micro hydropower projects and 42.4% of the respondents have access to facilities like water supply as social development program. The details of the respondents views on access to facilities such as access road, electricity, water supply and sewerage is given in the Figure 5.11.

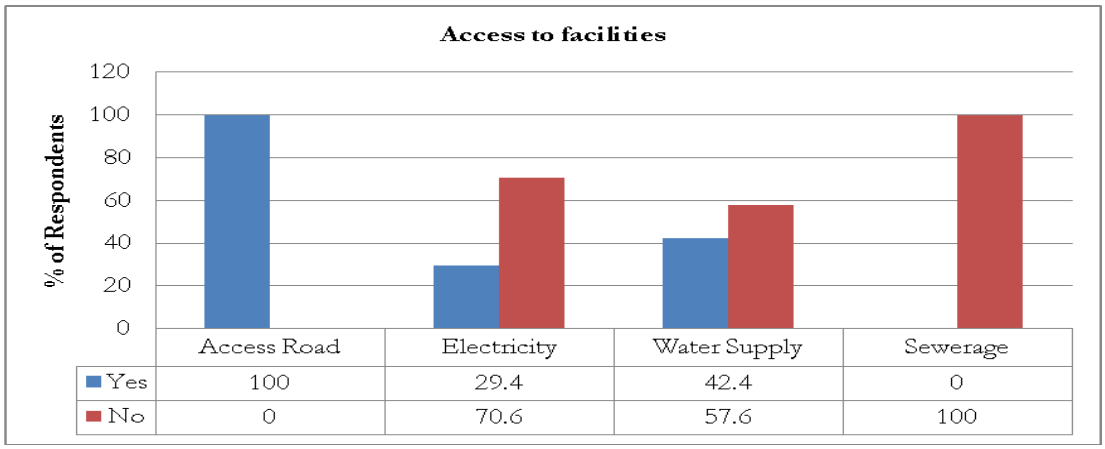

Figure 5.11.Access to facilities

On asking about the benefits obtained from the projects, 90.6% of the respondents expressed that education facilities is achieved due to the project and 82.4% of the respondent states that income is increased because of the employment in the project. The details of the benefits achieved because of the project are shown in the Figure 5.12.

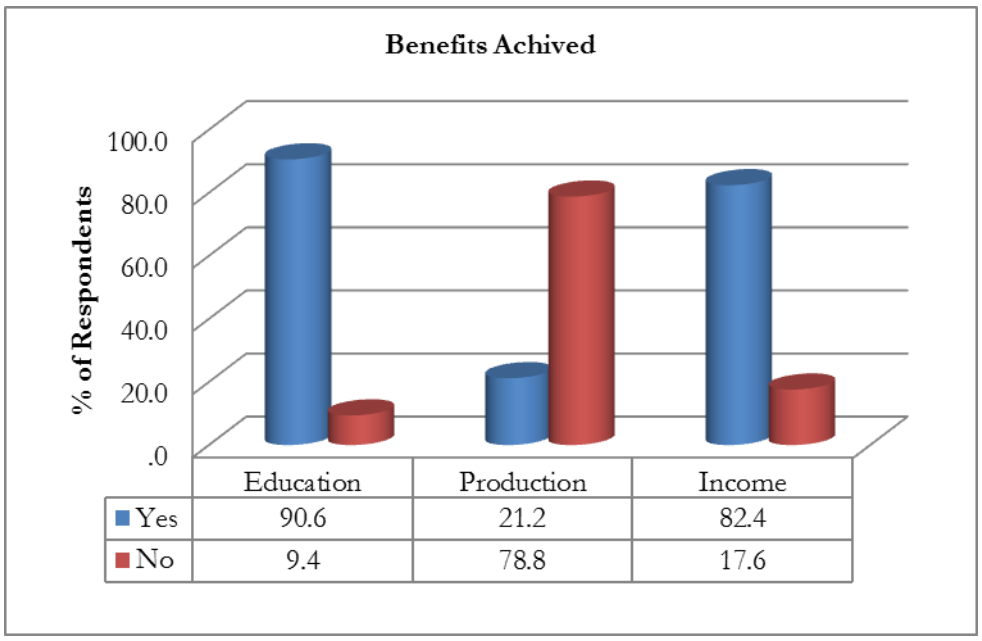

Figure 5.12.Respondents' views on benefits acquired

b) Results obtained from interviews

Based on interviews with UTHEP officials, it is known that UTHEP and its contractors have given more priority to local people for the employment. The affected villages have benefited with access road, education, electricity, water supply and Medicare as a social development program in the project area. Industrial activities are increased within the project area. UTHEPL has provided civil/electro mechanical, survey and agricultural trainings to seriously projected families to employ them in the project. On interview with survey official of Dolakha district, it is known that registration of missing land and buying and selling of land are increased in the area. Business activities and land valuation is also increased because

of the project. According to interview with civil society members and VDC heads, numerous conflicts from blasting, landslides, deforestation etc. is existed by the construction activities because of disturbance in stable nature surface. These are mitigated by proactively mitigation measures such as compensation of damage structure, construction of retaining structures. UTHEPL official, civil society members and CDO also mentions that UTHEP has planned to distribute 10% share of the project to residents of Dolakha district to involve them as an owner of the project by promoting local level investment for better livelihood. It is also known from interview with civil society members that women and children are disadvantaged group within the population in the construction phase.

c) Impression from field observation

Since the researcher stayed almost two weeks in the site, it was observed that literacy rate is increasing in the project area. Electricity, water supply, health post, sanitation were rarely found in the Singati, powerhouse and dam area. Bus facilities were only available from Kathmandu to Singati via Charikot. The transportation facilities were not available to reach to powerhouse and dam site. However, project is constructing access road to reach up to the dam site. The electricity, water supply, health post and school facilities are continuously increasing as a social development program in the project area. The business activities are increasing in the project area. Some local people are employed as an unskilled labour in the project work. Overall the socio economic condition of the affected people is continuously becoming better. It is noticed that mixing of workforce in the communities creates social disturbance in the project area.

5.3.2.2. Access to land

The results are presented based on the indicators such as ways of getting land, status of equity of land in project area and size of land holdings (Table 3.7: policy aspect). Data related to access to land are collected by questionnaire survey and presented as follows.

From the household questionnaire, it is found that 54% of the respondents get inherited land and only 9% purchase land as shown in the Figure 5.13. It shows that respondents do not have more capacity to purchase the land. On asking about the views on equal access of land to all, 40% of the respondents viewed that they highly agree on it and 59 % of the respondents agree for the same as mentioned in the Figure 5.14.

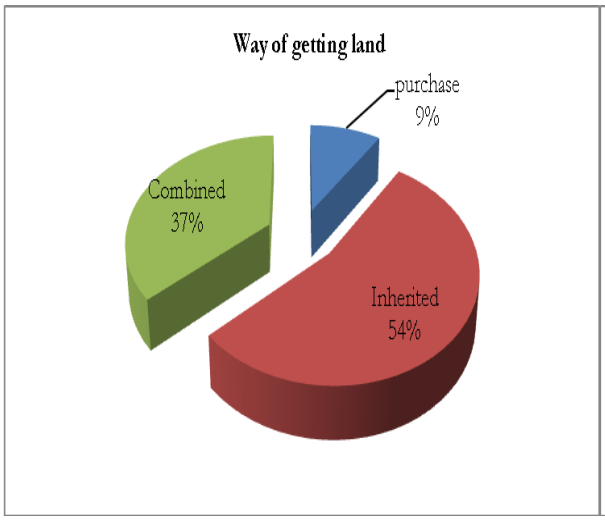

Figure 5.13.Way of getting land

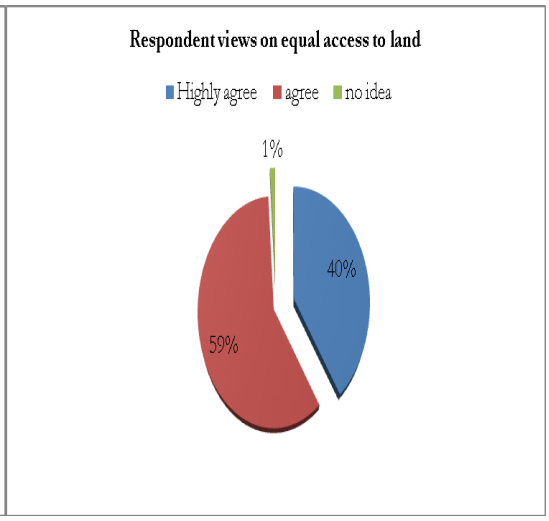

Figure 5.14.Views on equal access to land to all

48.3% of the respondents have less than or equal to 2 ropanies of land and 27.1% of the respondents have more than 2 and equal to 5 ropanies. Similarly, remaining respondents have more than 5 ropanies of land

as captioned in the Figure 5.15. It means that all respondents have access to land and more respondents have few lands.

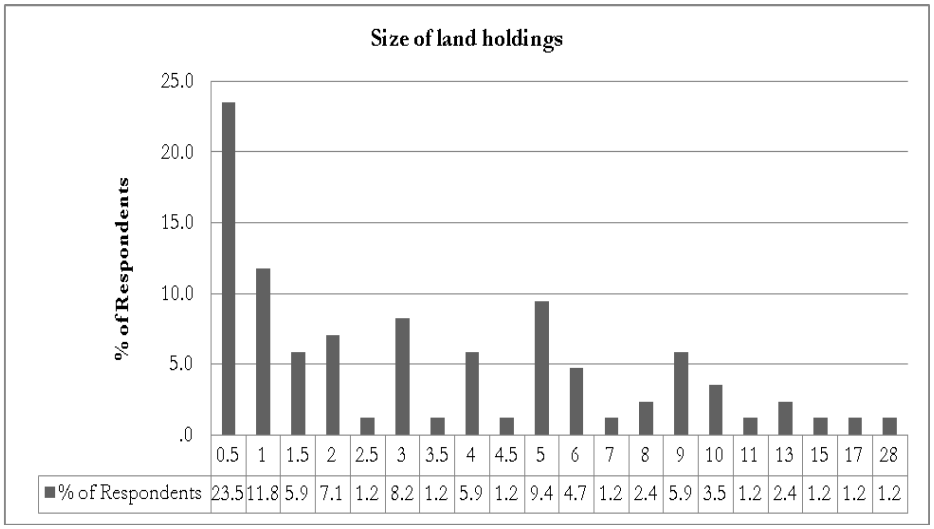

Figure 5.15.Size of land holding

5.3.2.3. Land tenure Issue

The results are presented depending on the indicators such as types of ownership (Table 3.7: Land tenure aspect). The results of data analysis in land tenure issue obtained from household questionnaire; interviews and field observation are presented as follows.

a) Results obtained from household questionnaire

It is found that 67% of the respondents themselves are the land owner and 33% has both combined i.e. tenant and ownership of their land as mentioned in the Figure 5.16. It shows various types of land right exists in the project area.

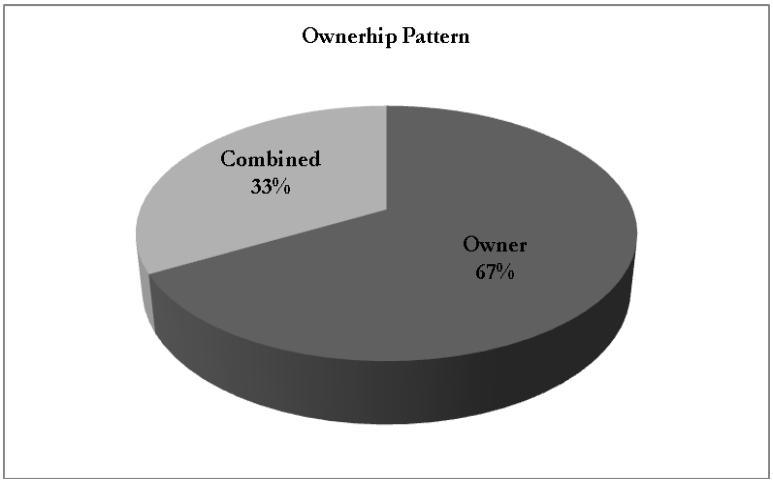

Figure 5.16.Ownership pattern

On raising the question about the purpose of focusing of land tenure in hydropower development plan 98.8% of the respondents express that it is to reduce land conflicts and 54.1% of the respondents mentions that it is for smooth project activities as shown in the Figure 5.17. They argue that land conflicts such as low valuation, unfair compensation etc. can be resolved if land tenure is focussed explicitly in hydropower development plan. Access to information and public participation enhances the transparency about the project activities.

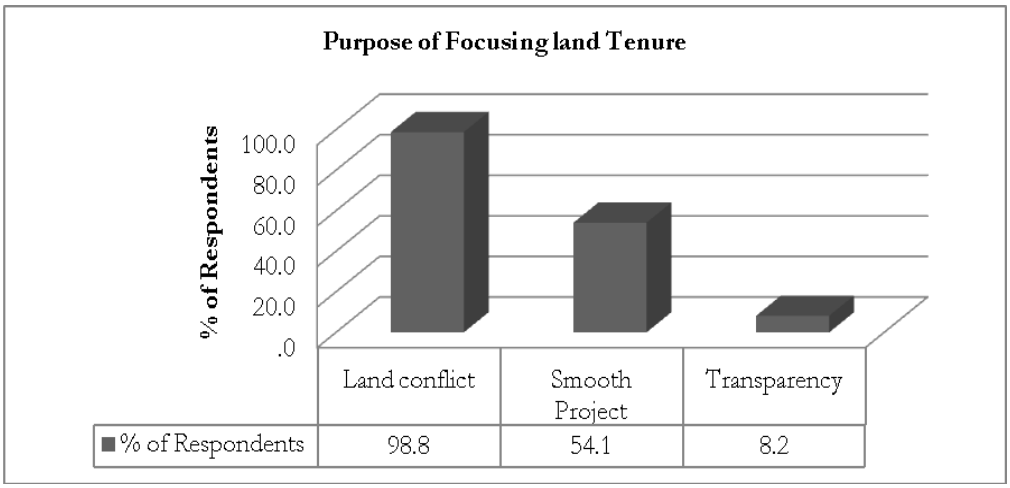

Figure 5.17.Purpose of focusing land tenure.

b) Results obtained from interviews

The results are based on indicators such as types of ownership and use of land and types of land policy formulation approach (Table 3.7: Land Tenure & policy aspect). Based on the interviews with experts, it is easy to construct hydropower project in government land since government is directly attached either from the investment point of view, being owner or making policy for the hydropower development in the country. The private land creates more conflicts because of change in land value by hydropower development in the area. In public land, more people is involved having different idea and politics. According to them experience shows that people have more sentiments on religious and cultural land. So, it is tough to construct hydropower projects in this land. An expert also mentions that apart from freehold rights, leasehold right can also be exercised for the hydropower development. Hydropower development should be planned in barren land as far as possible comparing to agricultural land and forest land. The land use planning should be made for construction of project features, contractors and engineer's camp, material storage and for tunnel spoil. The bottom up approach of policy formulation should be followed in allocating hydropower development because local people know more about real problems in the project area. An expert also mentions that land tenure should be considered in hydropower development plan for the sustainable development of the project.

c) Impression from field observation

It is observed that the project area has some religious land. The alignment of hydropower project is planned in agricultural land, forest and barren/cliff land. There are few agricultural lands comparing to forest land as it has more slope area.

5.3.2.4. Land Acquisition Issue

The results are presented based on the indicator such as types of land conflict, stakeholder and their role, and types of land acquisition procedure (Table 3.7: Threats and power degree & acquisition aspect). The results of data analysis in land acquisition issue obtained from household questionnaire; interviews and participant observation are presented as follows.

a) Results from household questionnaire

It is found that different types of land conflicts exist during land acquisition in UTHEP. It is noticed from the respondents of household questionnaire that 34.1% of the respondent faces low compensation, 28.3% of the respondents have no timely compensation and 21.2% of the respondents face low valuation during land acquisition as mentioned in the Figure 5.18. It reflects that issues such as land acquisition are not

properly considered in hydropower development plan. According to them access road is slow in progress because of these conflicts in UTHEP.

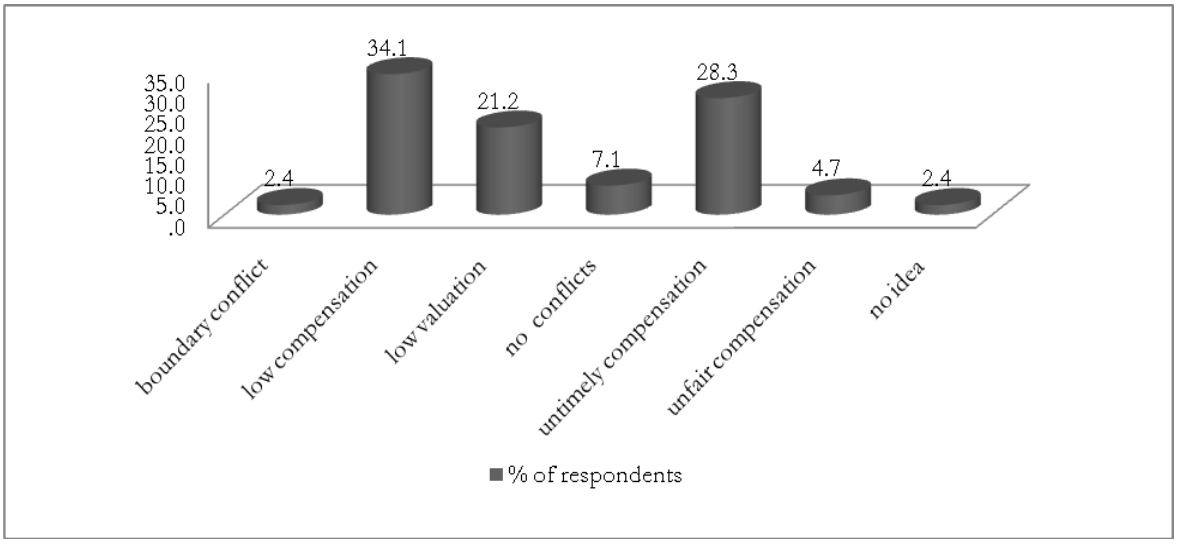

Figure 5.18.Types of conflicts during Land acquisition

b) Results obtained from interviews

According to interview with UTHEPL officials it is known that UTHEP follows the land acquisition act of Nepal for the compensation. Based on this act it formulated compensation fixing committee constituting CDO, DDC, Survey office, land revenue office, District Technical office and VDC secretary for deciding compensation amount and solving any conflicts regarding land acquisition and compensation. They assess damage of the properties due to the project activity and decide on compensation amount. According to experts ACRP should be prepared and implemented in hydropower development. Mostly, cash to land and some resettlements were done to acquire the land for the project. According to VDC secretary, there was conflict because of low valuation of land in Bhimeswor municipality and nearby area. Based on interview with CDO, they did the valuation of the property involving both market price and government price.

c) Impression from the participant observation

From the participant observation, it is observed that the compensation was done with the cash to acquire the land. It was noticed from the affected families that unfair compensation was made for land acquisition. It was also found that they did not get timely compensation.

5.3.2.5. Land tenure stakeholders in hydropower development

The results of data analysis of land tenure stakeholders in hydropower development issue obtained from household questionnaire and interviews are presented as follows. The results are presented based on the indicators such as stakeholder, their role and expectation (Table 3.7: External factor).

a) Results obtained from household questionnaire

Regarding the views on statement that "Interest of stakeholders can be fulfilled without their involvement" in hydropower development, 35% of the respondents disagree with the statement and 34% of the respondents highly disagree with the statement as mentioned in the Figure 5.19. It seems from the data that most of the participants highly disagree that interest of stakeholders cannot be achieved without their involvement in various stages of hydropower development. According to them their claim and real interest cannot be identified without their involvement.

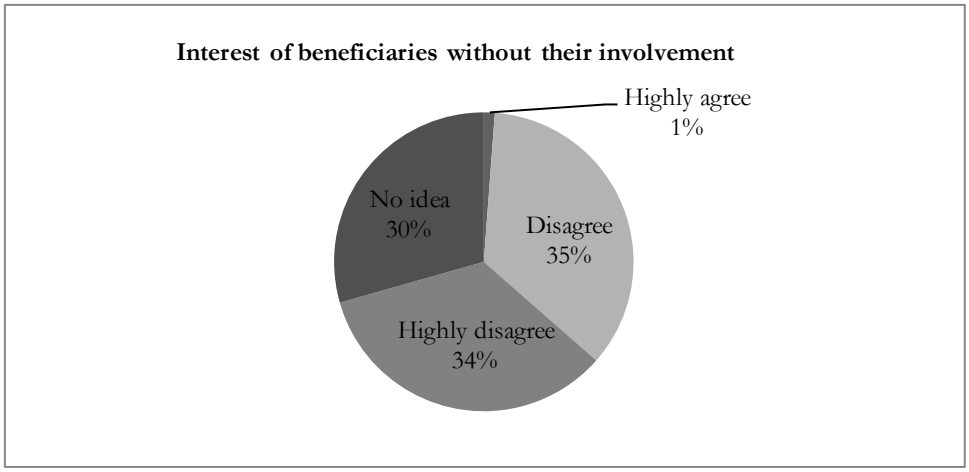

Figure 5.19.Interest of beneficiaries without their involvement

b) Results obtained from interviews

Based on the interviews with UTHEP officials, experts and VDC secretary, it is known that stakeholders plays very important role in developing this hydropower project. They have co-operative role and supports in solving local level problem. The major stakeholders in Upper Tamakoshi Hydroelectric project are UTHEPL, NEA, Investors, Survey Department, CDO, VDC, DDC, hydropower experts, affected families, civil society member, all entrepreneurs, National Hydropower Association etc. According to interviews with VDC secretaries there exists duplication of activities in supporting the school because of lack of coordination between UTHEP and VDC.

5.3.2.6. Public participation and access to information

The results are highlighted based on ways of involving stakeholders, number of participants participated in each stage, benefits of participation and types of people getting information easily (Table 3.7: Governance aspect). The results of data analysis in public participation and access to information issue obtained from household questionnaire and interviews are presented as follows.

a) Results obtained from household questionnaire

93% of the respondents mention that UTHEP shares benefit for minimizing land conflicts. 6% of the respondent said that awareness program is done for minimizing land conflicts as mentioned in the Figure 5.20.

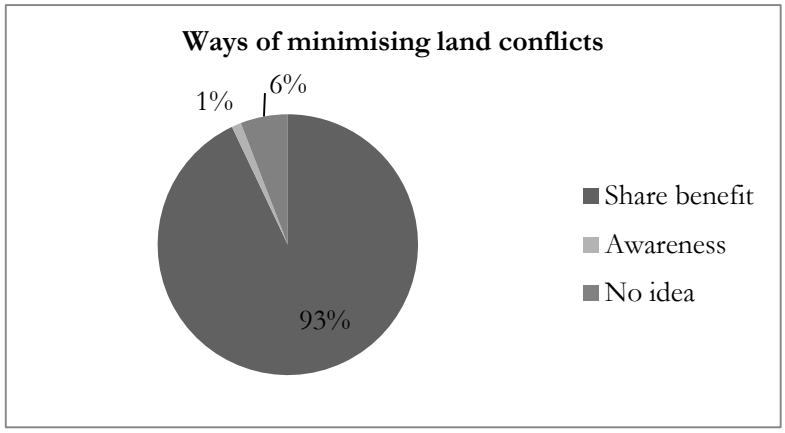

Figure 5.20.Ways of minimizing land conflict

From the results, it is found that 23% of the respondents participated in the planning process of hydropower development. 1% of the respondents participated in decision making. 58% of the participants expressed that they have not participated in any phases of hydropower development of UTHEP as

mentioned in the Figure 5.21. It is known that respondents in the planning stage took part in public hearing during an EIA process. Some of the respondents are involving in the construction activities.

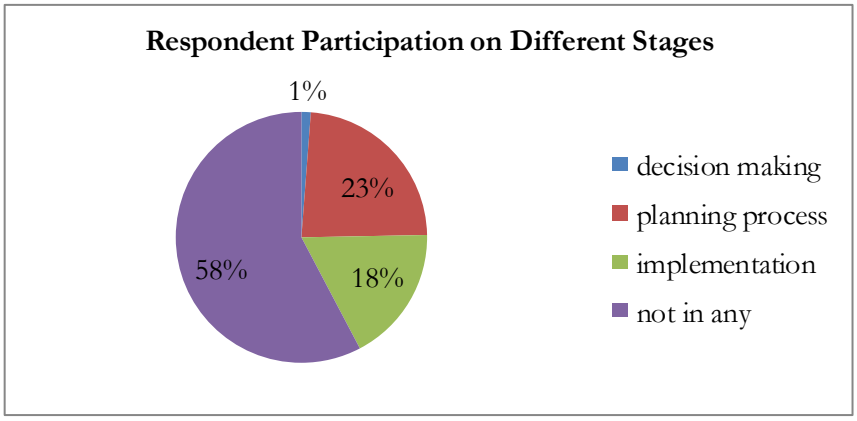

Figure 5.21.Respondent views on participation at different stages

65% of the respondents agree that participation at each stage of hydropower development reduces land conflicts. Similarly 34% highly agrees with the statement as mentioned in the Figure 5.22. According to them, participation creates an environment for consensus, negotiations and feedback.

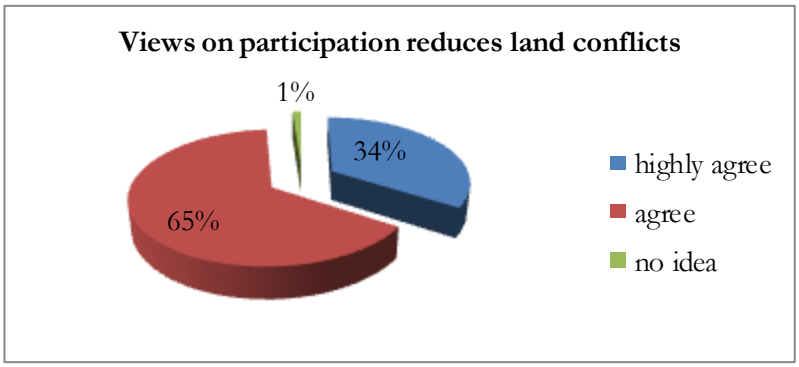

Figure 5.22.Respondent views on participation reduces land conflict

Regarding access to information 40 % of the respondents highly agree that it minimizes the land conflict in hydropower development. 59% of the respondents agree with the statement as mentioned in the Figure 5.23. According to them access to information in right time in right way resolves the land conflicts.

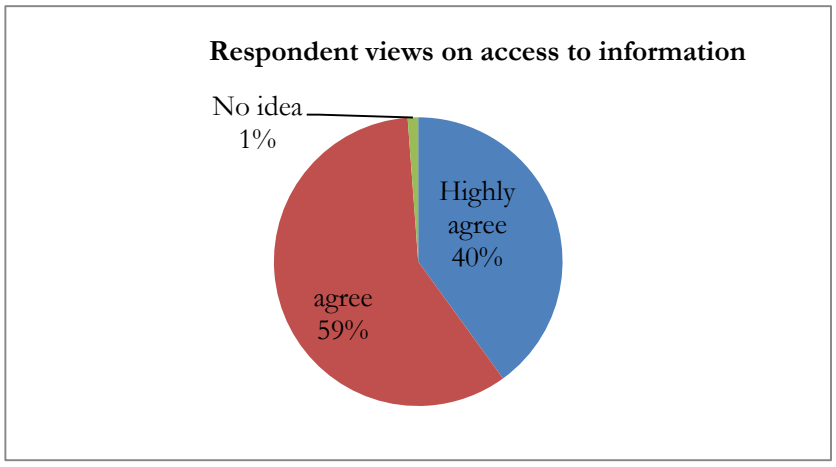

Figure 5.23.Respondent views on access to information reduces land conflict

All respondents agree that public participation and access to information in each stage of the hydropower development resolves land conflicts by consensus. 97.6% of them express their views that feedback can be done for minimizing land conflicts. It can be resolved by making transparency and awaring about the situation as mentioned in the Figure 5.24.

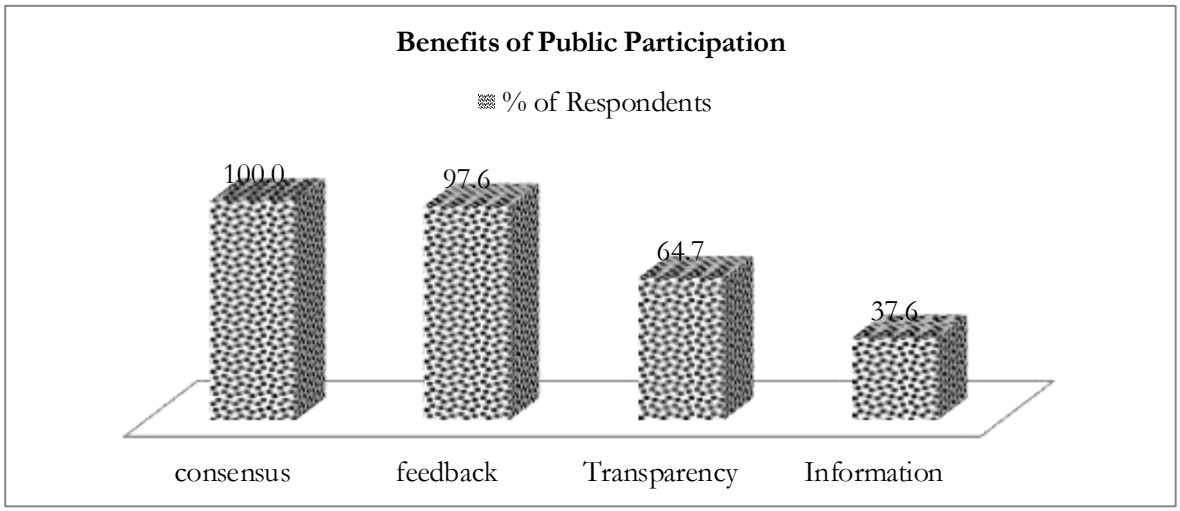

Figure 5.24.Respondent views on ways of minimizing land conflicts

When asking about easiness for access to information, it is found that 52% of the respondents argue that access to information about the project is easier to community leaders.19% of the respondents mention that it is easier to local people as shown in the Figure 5.25. According to them, most of community leaders used to live in Charikot.

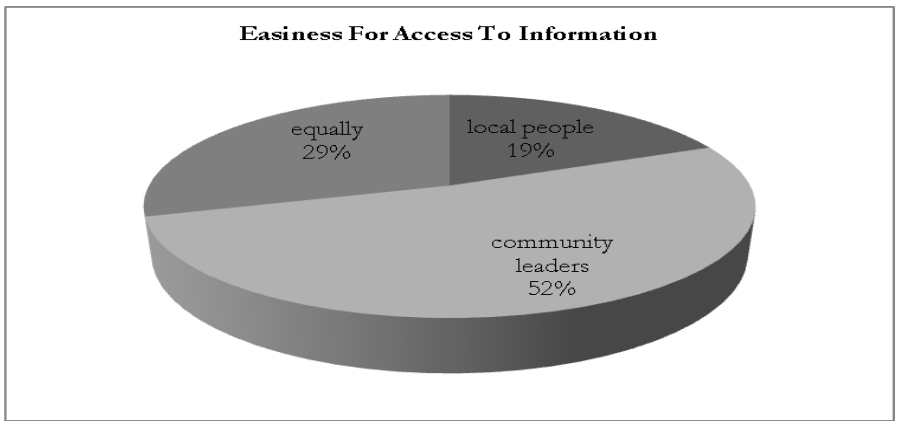

Figure 5.25.Respondent views on easiness for access to information

b) Results obtained from interviews

Based on interview with experts, public participation is very essential in all stages of hydropower development because development is for all. Without their participation project cannot be successful. They further added not only on these stages, participation should be done to share benefits such that affected people can support their livelihood after construction period. According to interview with VDC heads, the project has not involved the VDC directly in its activities.

Based on interview with UTHEP officials' household surveys, national and local newspaper, and local FMs are used for disseminating information about the project information. They expresses that access to information is provided by the site offices in project area. An expert mentioned that the development activities should be transparent for minimizing the land conflicts for which access to information plays

very important role. Experts also highlighted that before the construction of the project information should be disseminated about the benefit offered by the project, long and short term positive and negative impact and about submergence of land. They further added that up to date information about the project should be disseminated for the stakeholders. Public participation and access to information reduces negative feelings of the society towards the project and minimize conflicts by agreements and negotiations. The land conflicts such as conflicts related with resettlement, land use conflicts, boundary conflicts, ownership conflicts, conflicts with low, unfair and non-timely compensation can be minimized by making the development activities transparent with broader public participation and access to information.

5.3.2.7. Environmental issues

The results are presented based on the indicators such as types of environmental impact and kinds of mitigation measures (Table 3.7: Policy & Impact aspect). The results of data analysis in environmental issue obtained from interviews and field observation are presented as follows.

a) Result obtained from interviews

According to an interview with environmentalist, most of the construction activities such as headrace tunnel, penstock tunnel, powerhouse etc. are underground in UTHEP. Therefore, there is minimum effect on the environments. This hydropower project use minimum agricultural land and is also called as environment friendly. It is also known that time to time water is sprayed in the constructed road to protect environment from being polluted because of heavy equipment during construction period. According to him in interview, plantation in 1:25 will be carried out as mitigation measures for deforestation in the project area. According to interviews with hydropower experts even though project disturbs some environments, new environments situation can be created by applying mitigation measures and monitoring during hydropower development. From interview with UTHEPL, it is known that complete EIA is carried out in the planning and detailed feasibility study stages and approved from the government. The ICIMOD official mentions that any infrastructure development should not have detrimental effect on environment for sustainable development of the project.

b) Result obtained from field observation

It is noticed that landslides occurs because of the construction activities in the project area. Deforestation for the access road corridor from Dolakha to Singati during upgrading of existing road and from Singati to dam site during construction of new roads was seen in the area. Access tunnel is already completed to reach to the power house site. Since most of the project feature has underground structures there is less environmental negative impact in UTHEP.

5.4. Assessment

After the results of data analysis of primary and secondary data, assessment of role of land tenure in case study is carried out in this section. The assessment is based on the various aspects as discussed in the chapter 3, section 3.4.

a) Policy aspect

The Figure 5.21 indicates that mostly top down approach of policy formulation is followed in UTHEP. Bottom up approach is followed in some issues of planning and in implementation phase. Public hearing and environmental impact assessment was carried out in planning and feasibility stage of hydropower development (Subsection 5.3.2.6: Household questionnaire). Although most of the respondents gave positive response for equity in access to land (Subsection 5.3.2.2: Figure 5.14), it is not found in UTHEP area. Although the project is allocated mostly in forest land in comparison to agricultural land (Table 5.2), mitigation measure is planned for deforestation (Subsection 5.3.2.7: Interviews). This project has strong concern with the environmental sustainability and seems environmental friendly because of technological

development of tunnel and underground structures (Subsection 5.3.2.7; Field observation). The project is facing numerous social and economic problems from the affected families and gets delayed in its schedule (Subsection 5.3.1.2). Therefore, economic sustainability is weakly concerned in the project development.

b) Governance aspect

Extensive public participation in decision making, planning and feasibility study and implementation phases is not found in Upper Tamakoshi Hydroelectric project (Figure 5.21). Interest of the stakeholders is not considered at all stages of hydropower development. There is no good coordination between the hydropower project and VDC. Even the activities carried by them are duplicated (Subsection 5.3.2.5: Interviews). Based on the Figure 5.25, access to information is also very weak in local level in Lamabagar and Gongar area. Since community leaders, civil society members live in headquarter they find easy access to the information (Subsection 5.3.2.6; Household questionnaire). This empirical data indicates that access to information to affected families is very limited. Without access to information and public participation, project is not transparent. Therefore; governance aspect is weak in UTHEP.

c) Tenure and rights aspect

The subsection 5.3.1.1 shows that the project covers private land, state land (government land and public land) and religious land. UTHEP is allocated mostly in government land and has good allocations (Subsection 5.3.2.3: Interviews). It does not affect any religious land (Subsection 5.3.1.1). It is also allocated mostly in forest land comparing to agricultural land and barren land (Table 5.2). Most of the parcel in Dolakha district has been registered. The people missing to get the certificate also got it at the time of implementation project (Subsection 5.3.2.1: Interviews). Therefore, it can be said that land tenure security is increasing because of the hydropower project.

d) Land acquisition aspect

The way of acquiring land for the UTHEP is expropriation (Subsection 5.3.1.2). During the acquisition of land various types of conflicts such as low compensation, low valuation etc. exists in UTHEP (Figure 5.18). These procedures are not well accepted by affected families and create obstacles for the project (Subsection 5.3.1.2). Long term resettlement plan is not prepared for the family to be relocated (Subsection 5.3.1.2). Affected family doesn't know perfectly about the land acquisition procedure (Figure 5.21 and Figure 5.25). Based on these results, it is argued that land acquisition procedure adopted by UTHEP is not well accepted and comprehensive.

e) Threats and power degree aspect

There exist various types of land conflicts during implementation stage (Subsection 5.3.1.2 and Figure 5.18). Since UTHEP is national level hydropower project (Chapter 4, Section 4.2), the project is headed by resolving the conflicts by sharing investment to all stakeholders (Figure 5.20).

f) External factors aspect

The major expectation of the affected families is the better livelihood from the project. They want employment, considerable compensation for the loss of land, proper resettlement and participation in all stages of hydropower development (Subsection 5.3.2.1, 5.3.2.4 & 5.3.2.6). The project has planned to distribute the share to all key stakeholders as their expectation (Subsection 5.3.2.1: Interview and Figure 5.20). Regarding the stakeholders capacity, most of them are not capable for the technical works (Subsection 5.3.2.1: Field observation). UTHEP is supporting in capacity building of affected families through the social development program (Subsection 5.3.2.1: Interview). All of these results indicate that the project tries to meet the stakeholders' expectation as far as possible.

g) Impact aspect

The project is improving the socio economic status of the society (Subsection 5.3.2.1: Household, interview and Field observation). There is minimum environmental impact by the UTHEP because of its underground and tunnel structure in design (Subsection 5.3.2.7: Interview and Field observation).

5.5. Summary

This chapter dealt with data analysis based on the indicators and assessment of role of land tenure in UTHEP. Based on secondary data, it is known that UTHEP occupies private land and state land (government land and public land). It does not affect any religious land. UTHEP exercises both leaseholds by acquiring land in rent and freehold property rights system by purchasing the land. It is allocated in forest land, agricultural land and cliff/barren land. Public participation in all stages and access to information at local level is weak in UTHEP. Land is acquired by the compulsory purchase for the project. During the procedure various types of conflicts exists because of which progress is below expectation. The role of stakeholders is not well defined so duplication of activities exists in the project.

The second phase of this chapter is the assessment of role of land tenure in UTHEP based on the assessment framework (Chapter 3, Subsection 3.3). An assessment result shows that an allocation of land in UTHEP is good in terms of ownership of land. It is also found that there is weak consideration of economic sustainability because of delayed in access road construction but environmental sustainability is well considered because of tunnel and underground structure. The land acquisition procedure adopted by the project is not well accepted by all stakeholders. There is no good coordination between the stakeholders. This is supported by the duplication of activities in supporting the school as social development program carried out by UTHEP and VDC. The project affected people are working as unskilled labour in the project. The project has already started the training to all SPAF to employ them in the project. The project has planned to distribute the 10% share to the residents of Dolakha district to promote local level investment and to feel them as an ownership of the project.

6. DISCUSSIONS AND ROLE OF LAND TENURE

6.1. Introduction

The previous chapter deals with data analysis and assessment of role of land tenure in UTHEP. This chapter aims to discuss on assessment results and role of land tenure in hydropower development for social and environmental effects. Firstly, an assessment results based on tenure forms and its allocations, land acquisition and role of land tenure stakeholders are discussed based on good practice criteria as developed in chapter 3. The role of land tenure in hydropower development for social effects is described after the discussion on assessment result. After discussing on it, the role of land tenure in hydropower development for environmental effects is mentioned based on the results obtained from chapter 2 and chapter 5. Finally, summary is given in the last section of this chapter.

6.2. Discussions on Assessment Results

The findings from the assessment results on following issues related with land tenure are discussed in this section. This section also discusses on the gaps with reference to good practices criteria in the issues related with land tenure such as tenure forms and its allocations, land acquisition, land tenure stakeholders and their role.

a) Tenure forms and its allocations

UTHEP is allocated more in government land in comparison to private land (Section 5.4: Tenure and right aspect). Because of more allocations on government land, it faces less land conflicts and finds easier in implementation stage comparing to Kali Gandaki "A" hydropower project (Subsection 2.3.1, 2.4.3 and Subsection 5.3.2.3: Interview). In terms of land use, it is allocated more in forest land in comparison to agricultural land and barren/cliff land in planning stages of project development (Section 5.4: Tenure and right aspect). The mitigation measures are planned for the deforestation for minimizing the effects in UTHEP. There should be minimum negative effects on environment according to good practice criteria (Chapter 3, Section 3.3) which is found in UTHEP because of design of tunnel and underground structures. Although based on the good practice criteria (Chapter 3, Section 3.3) extensive public participation and access to information is supposed to be ensured in the planning stages of hydropower development, it is found that governance principles such as public participation and access to information in the planning and feasibility stage of hydropower development are weak in UTHEP. Only limited respondents participated in this stage and access to information is limited for affected families.

b) Land acquisition

According to the good practice criteria, the project is supposed to prepare the relocation plan and follow the comprehensive compensation procedure to resolve the conflicts during land acquisition (Chapter 3, Section 3.3). But, it is found that land acquisition procedure applied in UTHEP is compulsory purchase and is not comprehensive (Section 5.4: Land acquisition aspect) because there exists various types of land conflicts such as low valuation, land use conflicts etc. Although bottom up approach of policy formulation is in good practice, it is not found in UTHEP (Section 5.4: Policy aspect) because public participation during land acquisition is not extensively considered in implementation stage of hydropower development. Therefore, land acquisition procedure is not well accepted in this project and hinders the progress of construction.

c) Land tenure stakeholders

It is found that various land tenure stakeholders are involved in UTHEP with different roles (Subsection 5.3.1.3). They don't have coordination among each other and duplication of activities occurs between them (Section 5.4: Governance aspect). The duplication of the activities is seen in supporting the school as social development program by UTHEP and VDC. Reference to good practice criteria (Table 3.7: Governance aspect), there should be good coordination among the stakeholders. Their interest should be addressed in all stages of hydropower development. Because of these gaps in the project, expected progress has not been achieved in construction activities which lead to time and cost overrun of the project.

6.3. Discussion on Social Effects

Based on the conceptual framework in chapter 1, subsection 1.7.1, when hydropower development plan does not focus on land tenure, it creates conflicts in the society. This statement is supported with the findings in (Section 5.4: Threats and power degree aspect and Subsection 6.2.1(b)). Land use conflicts such as conflicts caused by blasting, movement of heavy vehicles etc. are common during upgrading and construction of access road and access penstock tunnel. Due to these conflicts, the progress of the construction work of access road in UTHEP is hindered. Therefore, society has not achieved the full benefit in terms of employment and electricity. Influx of workers in host communities in the project area creates mix in culture between them and promotes social problem like unrest and disputes (Subsection 5.3.2.1: Field observation). The occurrence and significance of these affects are a function of the workforce size and composition; the larger and more foreign the workforce, the higher the anticipated social disturbances. It is also found that increase in incidence of diseases such as sexually transmitted diseases within the project area. The pressure on existing social services occurs by the influx of the workforce to host communities.

Women are the disadvantaged group within the affected families in the area (Subsection 5.3.2.1: Interview) because they have major three role. They have role as reproducers (child bearing, child rearing), producers such as work done for payment and home production and their community management role. The project activities in the region further add to the role of women due to the constant involvement of male members of families in the project. On the other hand, a steady income earned by the head of the house in some degree reduces the financial burden of women of project area. The extra income generating capacity of male members of households can however further aggravate the dominance on women in some typical households of *Brahmin* and *Newar* community. Contradictory to this in *Sherpa*, *Tamang* and *Gurung* families, women are found to be equally powerful in making major decision of the household matters. Therefore, the impact due to the project activities on the women is low in indigenous community than in others. Similarly, children are also the disadvantage group in the construction stage (Subsection 5.3.2.1: Interview). According to interview with civil society members despite GoN's ban on child labour, children are exploited to pursue menial jobs in UTHEP construction activities.

But, when the hydropower development plan extensively focuses on land tenure, there is minimum land conflict during the development (Chapter 2, Subsection 2.4.1). Therefore, the hydropower projects are successful. The affected families get the economic benefit from the employment, access road, electricity; general improvement of infrastructure and services, market facilities for local product, flow of goods and services and even the shares of project and power output. So, consideration of social effects from political decision making to operation stage of hydropower development is essential for sustainable development of the project.

6.4. Discussion on Environmental Effects

Similarly, when hydropower development plan does not consider land tenure, it effects environment negatively. There is loss of vegetation and trees because of UTHEP in the project area. For construction in project area, total no of trees to be felled for the access road and project facilities has been estimated as 8420 out of which 5290 are above pole size and 3130 are pole size. Since the design of UTHEP has tunnel and underground construction, it has not affected the surroundings above it. UTHEP seems to be environmental friendly because of application of this technology in design. Land use pattern is changed from agricultural land to built up area having project features. The disturbance in ecosystem and reduction of population, habitat and biodiversity of species are increased because of the project development. The river morphology changes because of diversion of water during dam construction. The landslides occur by the use of heavy equipment in construction activities. Arun III hydropower project in Nepal was cancelled due to lack of consideration of environmental effects in its development (Subsection 2.4.3).

In other hand, when hydropower development is allocated with land use planning, there is minimum negative effect on environment. The vegetation in quarry site and muck disposal area is planned for improving aesthetic view of the area. The construction of tunnel and underground works in UTHEP has minimum negative effects on the environment. These are supported by the evidences in Aurland hydropower project in Norway (Subsection 2.4.1).

The environmental issues should be considered from political decision making to operation stage in hydropower development to make the development environmental friendly and successful as experienced from Aurland Hydropower Project in Norway (Subsection 2.4.1). The landscape of the project area can be improved by considering environmental issues in implementation and operation stage. The mitigation measures should be applied for loss of tress and vegetation. On this background, it can be said that hydropower development plan should focus on land tenure for minimizing negative environmental effects.

6.5. Summary

This chapter discussed on the findings from the assessment results and role of land tenure in hydropower development for social and environmental effects. The assessment result is discussed based on the good practice criteria as discussed in chapter 3, section 3.4. The allocation of land for UTHEP has focused on government land comparing to other types of land based on ownership pattern and forest land based on the land use pattern. Although the mitigation measures for the plantation of trees has not started, UTHEP has planned for mitigation measures for loss of tress and vegetation. Public participation and access to information has not been included in planning and feasibility stages of hydropower development.

Although from good practices criteria, there should be fair and considerable compensation during land acquisition. It has not been found in UTHEP. This explicitly shows the performance gaps during land acquisition. Relocation plan is not prepared in UTHEP. It distributes 10% share to support the local level investment and livelihood in post construction period.

The major social effects are influx of workers in host communities, change in income level, ownership pattern etc. Similarly, the major environmental effects are change in land use pattern, loss of trees and vegetation and reduction in biodiversity. The land tenure should be focused in all stages of hydropower development for minimizing social and environmental negative effects.

7. CONCLUSION AND RECOMMENDATIONS

7.1. Introduction

The previous chapter dealt with discussion on assessment results and role of land tenure in hydropower development for social and environmental effects. The main objective of this chapter is to make conclusion with reference to research question and research objective and to recommend for the further research.

7.2. Conclusion

The research has one main objective and two sub objectives as mentioned in the subsection 1.4.1 and 1.4.2. The conclusions are made addressing main and two sub objectives incorporating the answers of main research question and sub questions.

In order to obtain first sub objective, three sub questions were formulated as mentioned in chapter 1.

(a) What are the current practices in planning hydropower development?

In developing countries tenure issues like tenure forms and its allocations, land acquisition and role of stakeholders are not considered in planning hydropower development. Hydropower development plan mostly focus on technical components. Public participation is not broadly involved in the planning process. But in developed country, tenure issues are well considered in planning hydropower development. Social and environmental effects are considered from beginning of the project to the operation stage of hydropower development. Therefore, the projects are successful in developed country. On this background it is concluded that different countries have different practices in planning hydropower development depending on their willingness and capability to consider the tenure issues in hydropower development plan.

(b) What are the experiences available that include land tenure during the planning and implementation phases?

Private land, state land, religious land and common land are allocated for hydropower development in Norway, China and Nepal. Aurland Hydropower development in Norway is successful because of focusing of land tenure in its development. Land required for the construction of the project is acquired with the concessions based on broader agreements and negotiations in Norway. Comprehensive Land use planning was prepared during its development. Benefits of power output and project itself are shared to affected people and stakeholders are involved in the development process. In China and Nepal, mostly land is expropriated without comprehensive planning and broader participation of stakeholders. The role of land tenure stakeholders is not clearly defined. Therefore, it is concluded that different countries have different experiences of land tenure in hydropower development.

(c) What are the causes and social and environmental effects in changing land tenure by the hydropower development?

Hydropower project interferes on large quantity of land during its development. Therefore, it causes changing of land tenure in its development. It effects on land owners' income level, productivity, ownership structure, cultural, social values and norms. Similarly, land use pattern, farming practices are changed in changing the land tenure by the hydropower development. The loss of vegetation and trees occurs by the resettlement in forest land. It is concluded that mitigation measures are essential to reduce negative social and environmental effects.

The first research sub objective is *to find out land tenure requirements in the planning process of hydropower development*

The major land tenure requirements for the planning process and implementation are the tenure forms and allocations, land acquisition, land tenure stakeholders and their role. Policies, tenure and rights on land, governance, land acquisition, threats and power degree, external factors and impacts aspects should be considered in the processes of hydropower development. The elements under these aspects as mentioned in Table 3.4 are equally important in its development. It is concluded that these aspects and elements are the major land tenure requirements which should be focused in hydropower development plan for its sustainability.

To fulfil second sub objective, three sub questions were developed as mentioned in chapter 1, section 1.5.

(d) What are the roles of key stakeholders that concern with land tenure in hydropower development?

The role of government is to make policy for facilating the hydropower development, developer for negotiations of concessions, law institutions and financiers for providing mortgage loan and other stakeholders such as contractors for preparing muck and waste disposal plan from labor camps. Similarly, consultant organizes the land policy dialogue for the land tenure security. It is concluded that each stakeholders have defined role in hydropower development. The co-ordination among stakeholders is essential to avoid the duplication of the activities.

(e) How do they support minimizing land conflicts in balance with environmental and social effects?

Developer conducts broad and meaningful participation in minimizing land conflicts. They support in minimizing the land conflicts by sharing the benefits of the projects and power output to the affected families. They consider land and environmental issues from start to the operation phase of the project for minimizing social and environmental negative effects. It is done by providing access to information to all stakeholders. Affected people supports in minimizing land conflicts by participating and by expressing their claim and expectation to be fulfilled to the developer for the sustainable development of the projects. On this background, it is concluded that concessions with broader negotiations, agreements and sharing of benefits should be carried out to minimize the land conflicts in balance with social and environmental effects.

(f) To what extent public participation and access to information help resolving land conflicts in hydropower development?

Public participation and access to information help resolving land conflicts in political decision making, planning and feasibility study, design, implementation and operation stage of hydropower development. In decision making stage it supports for site selection by providing reliable information. In planning and feasibility stage, it resolves land conflicts by proper allocations of land. In design phase, it helps to determine the stakeholders' expectation. Public participation and access to information help resolving the land conflicts such as low valuation, non-timely compensation etc. by consensus in the implementation stage. In operation phase it helps by proper evaluation of social and environmental effects. Therefore, it is concluded that Governance principle such as public participation and access to information should be maintained in all stages of hydropower development.

The second sub objective is *to define the role of land tenure stakeholders in hydropower development and implementation*.

This sub objective has been fulfilled from the answers of the research sub questions *(d, e and f)* as discussed above.

The main objective of the research is to *assess the role of land tenure in hydropower development for social and environmental effects*.

The smooth development of hydropower project depends on ownership of land and its allocation during the development. As far as possible government land should be allocated for hydropower development. Hydropower development should be allocated focusing on land use planning to minimize social and environmental negative effects. The concessions can be implemented for acquiring the land with agreements and negotiations like in Norway. The success of any hydropower project depends on the process of land acquisition adopted by the project and consequences of the process in the society. When compulsory purchase of land is implemented, it should be carried out with comprehensive planning, agreements and negotiations with affected families. The identification of land tenure stakeholders and their role is very essential to reduce the duplication of activities. The fulfillment of stakeholders' expectation and interest for minimizing land conflicts during the development is the role of land tenure. The main role is to develop the sustainable hydropower projects by minimizing negative social and environmental effects so that it benefits the country. In this way the main objective of the research has been fulfilled.

Main Conclusion

Land tenure has very important role in making the hydropower projects sustainable. It should be focused in hydropower development plan for smooth development of the projects protecting cost and time overrun and minimizing negative social and environmental effects.

7.3. Recommendations

This research has made number of recommendations for the further researches which are discussed as follows.

An assessment framework is developed to assess the role of land tenure in hydropower development based on literature. It is used to assess the role of land tenure in UTHEP. The further research can be carried out to validate the strength of this assessment framework.

Interviews were taken to limited stakeholders but important one such as UTHEPL official, VDC heads, civil society members, experts/academia, survey officer, CDO. Further research can include the opinion of other stakeholders such as NGO/INGO. Their opinion is not included in this research because of unavailability of them at the time of field visit.

The ninety percent of land acquisition processes and its compensation was completed at the time of field visit. The construction of access tunnel was also completed. However; construction of main project features such as dam, desander basin, headrace tunnel etc. was not started. Further research can include detail social and environmental effects that occur during and after the construction of main project features in UTHEP.

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Appendices:
Appendix 1.List of Interviewee

SNo.	Name of the Interviewee	Position	Organizations
1	Mr. Basanta Shrestha	Division Head/ Geo Information Specialist	ICIMOD, Kathmandu
2	Mr. Pritam Malla	Planner	UTHEPL, Kathmandu
3	Mr. Mrigendra Bahadur Shrestha	Managing Director	UTHEPL, Kathmandu
4	Mr. Babu Krishna Bhandari	Planner	UTHEPL, Kathmandu
5	Mr. Madhusudhan Pratap Malla	Site Manager(Civil)	UTHEPL, Kathmandu
6	Mr. Sharad Bhakta Manandhar	Deputy Manager(Civil)	UTHEPL, Kathmandu
7	Mr. Mohan Gautam	Planner	UTHEPL, Kathmandu
8	Mr. Raj Bhai Silpkar	Site engineer	UTHEPL, Kathmandu
9	Mr. Manoj Tamarakar	Site Engineer	UTHEPL, Kathmandu
10	Mr. Purusottam Ranjit	Site engineer	UTHEPL, Kathmandu
11	Mr. Annand Bikram Shah	Site Engineer	UTHEPL, Kathmandu
12	Mr. Hari Krishna Baral	Environmentalist	UTHEPL, Kathmandu
13	Prof. Dr. Narendra Man Shakya	Department Head, Civil Engineering	IOE, Kathmandu
14	Dr. Durga Sangroula	Reader	IOE, Kathmandu
15	Er. Tara Nath Sapkota	Managing Director	High Himalaya Hydro Construction Ltd, Kathmandu.
16	Er. Ram Chandra Paudel	Executive Civil	GMR Energy Ltd, Kathmandu
17	Er. Arun Rajauria	Senior Manager	ESSAR Power Limited, Kathmandu
18	Mr. Shree Krishna Shrestha	CDO	District Administration office, Dolakaha
19	Mr. Balaram Shrestha	SDC Liaison officer/ member	Janhit Civil Society, Dolakaha, Nepal
20	Mr. Jeevan Lama	Media Person, Station manager	Kalinchowk FM, Dolakaha, Nepal
21	Mr. Rajendra Manandhar	Media Person / member	Janhit Civil Society, Dolakaha, Nepal
22	Mr. Dipak Basnet	Member	Janhit Civil Society, Dolakaha, Nepal
23	Mr. Ganesh Bahadur Khadka	Secretary	Lakuridada/Ghyang/Sushmachanywamawoti VDC
24	Mr. Narayan Prasad Subedi	Secretary	Orale/Jhule VDC
25	Mr. Mun Hari Thapa	Secretary	Gaurishanker VDC
26	Mr. Bishnu Prasad Shivakoti	Secretary	Lamabagar VDC
27	Mr. Rajendra Subedi	Secretary	Jhyanku VDC
28	Mr. Padama Bahadur Rahut	Chief officer	Survey office, Dolakaha

Appendix 2.Fieldwork Diary

Date	Day	Activities	Place
2010/09/10	Friday	Departure Journey	Netherland-Switzerland-Delhi
2010/09/11	Saturday	Departure Journey	Delhi -Kathmandu
2010/09/12	Sunday	Visiting KUSOM, Introduction to Local supervisors, Meeting with Local supervisors.	KUSOM, Kathmandu
2010/09/13	Monday	Visiting UTHPL and discussion about the case study area, collect reports. Visit to ICIMOD to collect information/data about the site and interview with Mr. Basanta Shrestha	UTHEPL, ICIMOD office, Kathmandu
2010/09/14	Tuesday	Presentation at KUSOM, collection of secondary data	KUSOM, UTHEPL Kathmandu
2010/09/15	Wednesday	Collection of topographic maps and Secondary Data(EIA Report, Auto cad Drawing)	UTHEPL, Kathmandu
2010/09/16	Thursday	Interview with planners, visit to HPL	UTHEPL, HPL, Kathmandu
2010/09/17	Friday	Interviews with experts	IOE, Kathmandu
2010/09/18	Saturday	Collection of digital data and preparation for next week	Nawaraj Subedi Home, Kathmandu
2010/09/19	Sunday	Interview with UTHEPL, Experts	UTHEPL, Kathmandu
2010/09/20	Monday	Interview with Expert	Kathmandu
2010/09/21	Tuesday	Collecting aerial photographs, Reports	DoS, UTHEPL, Kathmandu
2010/09/22	Wednesday	Preparation for site	Kathmandu
2010/09/23	Thursday	Visit to site office UTHEPL, Appointment interview VDC heads, collecting cadastral maps, registers	Charikot, Dolakaha
2010/09/24	Friday	Interview with VDC head	Charikot, Dolakaha
2010/09/25	Saturday	Interview with civil society members	Charikot, Dolakaha
2010/09/26	Sunday	Visit to site, Household survey,	Dolakha-Singati
2010/09/27	Monday	Visit site: Household survey	Singati to Gonger
2010/09/28	Tuesday	Visit site: Household survey	Gonger to Lamabagar
2010/09/29	Wednesday	Visit to dam site, field observation, verification of images, photographs, household Questionnaires	Lamabagar
2010/09/30	Thursday	Participant observation, Household Questionnaires, interview to environementalist	Gonger, Dolakha
2010/10/1	Friday	Questionnaires survey	Gonger
2010/10/2	Saturday	Data management, Singati to Dolakha	Dolakha
2010/10/03	Sunday	Interview with survey office in Dolakha, collection of cadastral maps and data, Returning to Kathmandu	Charikot, Dolakha

2010/10/04	Monday	Interview to CDO, Site engineers, Data management.	Kathmandu
2010/10/05	Tuesday	Collection of digital VDC maps from Nawaraj Subedi	Kathmandu
2010/10/06	Wednesday	Preparation for presentation at KU, Collecting Auto cad Drawing, Installing AutoCAD software	Kathmandu
2010/10/07	Thursday	Public Presentation on data collected at KU	Kathmandu University
2010/10/08	Friday	Data Management	Kathmandu
2010/10/09	Saturday	Preparation for returning back to Holland	Kathmandu
2010/10/10	Sunday	Returning Journey	Kathmandu –Delhi-Switzerland
2010/10/11	Monday	Returning Journey	Switzerland - Netherland

Appendix 3.Household Questionnaire

Objectives:

- To obtain information on socio-economic condition of the beneficiaries of this hydropower project, and impact on their living standard.
- To obtain general information from participants, and roles and responsibilities of different stakeholders associated with this hydropower project.

Household address: Date:

Location X= Y= Z=

Interviewer…

I. General Introduction and socio economic status

1. Gender: Male ☐ Female ☐
2. How many family members do you have?……
3. This hydropower project supports for education in your village. Do you agree with the statement?

Highly agree ☐ Agree ☐ Disagree ☐ Highly Disagree ☐ No idea ☐

4. How many members of your family are employed? _____, None ☐
5. This hydropower project improves the livelihood of your household?

Highly agree ☐ Agree ☐ Disagree ☐ Highly Disagree ☐ No idea ☐

6. What are the basic facilities available because of this project?

Road ☐ Electricity ☐ Telephone ☐ Supplied water ☐ Sewerage ☐

7. If others specify……
8. What benefit(s) is achieved after the implementation of this project? (More than one answer is possible)

Literacy rate is increased ☐
Production is increased ☐
Income level is increased ☐
No benefits is achieved ☐
Others……..

II. Access to land

9. Do you own land? Yes ☐ No ☐

If yes, please, follow the questions ahead …

If not, could you please, give the reason why you do not own land and go to the question (13)

_____

10. Are you owner or tenants of the affected land?

Owner ☐ Tenant ☐ combines (owner and tenant) ☐ if other specify……

What is the size of land you own? _____ (local unit)

11. How did you get the land?

Purchase ☐ Inherited ☐ Leased-in ☐ rented ☐ tenant ☐ others…

12. Which right do you perform in the land you possess?

Transfer ☐ Lease ☐ Inherit ☐ Mortgage ☐ others…..

III. Land Tenure issues

13. Land right/use is protected because of this project.

Highly agree ☐ Agree ☐ Disagree ☐ Highly Disagree ☐ No idea ☐

14. The purpose of focusing of land tenure in hydropower development plan is to

Minimizes land use conflict ☐ Transparency ☐ smooth operation of the projects ☐ If others specify……..

15. Land tenure should be the part of hydropower development plan?

Highly agree ☐ Agree ☐ Disagree ☐ Highly Disagree ☐ No idea ☐

16. Due care should be taken to assure equal access to land to all?

Highly agree ☐ Agree ☐ Disagree ☐ Highly Disagree ☐ No idea ☐

17. Hydropower development plan without focusing on land tenure creates conflicts in land rights and uses. Do you agree with the statements?

Highly agree ☐ Agree ☐ Disagree ☐ Highly Disagree ☐ No idea ☐

IV. Land Acquisition Issues

18. Did you know about the land acquisition procedure in developing this hydropower project?

Well ☐ Moderately ☐ less ☐ did not know anything ☐

19. Are you satisfied with the current approach of land acquisition procedure?

Fully satisfied ☐ Satisfied ☐ not fully satisfied ☐ not satisfied ☐

20. If not, why? _____

21. What is the status of your land after changing land tenure by hydropower development?

Increased than previous land ☐

Decreased than previous ☐

Remains same ☐

22. Do you experience any conflict by changing the land tenure in hydropower development?

If yes, what type is it?_____

23. When the UTHEPL provides you compensation, what you have done?

Buy new land ☐ build new house ☐ others: specify……..

V. Land Tenure stakeholders in Hydropower development.

24. Which approach of decision making, planning and the implementation in the hydropower development do you like?

UTHEPL alone ☐

UTHEPL in consultation with the community ☐

UTHEPL in consultation with the community and beneficiaries ☐

No idea ☐

25. UTHEPL can include all the interests of stakeholders without their involvement. Do you agree with this statement?

Highly Agree ☐ Agree ☐ Disagree ☐ Highly disagree ☐ No idea ☐

26. How responsive did you find the UTHEPL involved with land acquisition process to meet your interest?

Highly responsive ☐ Responsive ☐ low responsive ☐ not at all ☐

27. How easy is it to meet with the UTHEPL staff to put your interest regarding land compensation?

Very easy ☐ easy ☐ Not easy ☐ Not possible ☐

28. How did you involve in the compensation process for this hydropower project?

Land to cash compensation ☐

Land to land compensation ☐

By the resettlement ☐

Any other specify…….

29. What does UTHEP do for minimizing land conflicts?

Share benefit ☐

Awareness ☐

Promoting land governance ☐

No idea ☐

Others specify……

VI. Public Participation and Access to Information

30. Are you aware with the importance of this hydropower project?

Yes ☐ a little ☐ No ☐

31. In which stage have you participated in the process of hydropower development?

Planning process ☐ Decision making ☐ implementation ☐ Design ☐ not at all ☐

32. In which level of participation you are involved in this project?

Informative ☐ consultative ☐ co-operative ☐ Mobilization ☐ not in any ☐

33. Public participation reduces the land conflicts in hydropower development?

Highly Agree ☐ Agree ☐ Disagree ☐ Highly disagree ☐ No idea ☐

34. Access to information reduces the land conflicts in hydropower development

Highly Agree ☐ Agree ☐ Disagree ☐ Highly disagree ☐ No idea ☐

35. Public participation resolves the land conflicts by

Consensus ☐

Feedback provision ☐

Transparency ☐

Awareness about the situation ☐

Involvement of local people in decision making ☐

Others specify……..

36. Access to information is very essential for the successful planning and implementation of the hydropower project. Do you agree with the statement?

Highly Agree ☐ Agree ☐ Disagree ☐ Highly disagree ☐ No idea ☐

37. Access to information is easier to

Local people ☐ Expert group ☐ community leaders ☐ equally ☐ any other…

38. Do you know about the alignment of the hydropower project?

Exactly ☐ more tentatively ☐ less tentatively ☐ Not at all ☐

Thank You!!!

Appendix 4.Interview Questions to Expert /Academia

Interview Number……Date……
Name……Position……
Organization/Department……Contact Information…….

Objective: To obtain and verify knowledge/experience, information and practices on different aspects in land tenure and hydropower project.

1. Do you think land tenure should be focused in hydropower development plan? If Yes why?
2. Is public participation important during decision making, planning and implementation of hydropower development?
3. Is access to information important during decision making planning and implementation of hydropower development?
4. What are the disadvantages of having public participation in planning, decision making?
5. How can be the citizens, communities involved in the process of planning, decision making and implementation?
6. How important do you think the role of community in decision making, planning and implementation?
7. Do you think it is necessary to differentiate the participants into males and females during planning, decision making and implementation?
8. What type of land conflicts have you experienced in hydropower development?
9. In your opinion what type of land is more suitable for hydropower development?

Private land ☐ government land ☐ Trust land ☐ communal land ☐ any other
Why...

10. What results are expected from an increasing degree of participation by women in land acquisition?
11. After hydropower development landscape will be changed?

Highly Agree ☐ Agree ☐ Disagree ☐ Highly disagree ☐ No idea ☐
How?.....

12. Which approach of policy formulation can be found in decision making, planning and implementation of the project?

Bottom up approach ☐ Top down approach ☐ any others…….

13. Who are the main stakeholders for hydropower development?

Appendix 5.Interview Questions to official of UTHEPL (Managing Director)

Interview Number……Date……
Name……Position……
Organisation.....Contact Information…….....
Objective: To obtain knowledge/experience and information on different aspects of land Tenure and about UTHEP

1. What are the major aspects for the development of UTHEP?
2. What is your opinion about the hydropower project in the area? Does it provide benefit to society?
3. Who are the key stake holders and what are their interests in this project?
4. Is there any resettlement of the people from the project area during the development of this project?
5. Do you face any land conflicts during the development of the projects?
6. In which land like government land (forest area) have you resettled these people?
7. Is there any public participation in decision making process of this hydropower project?
8. What were the advantages of public participation in decision making process?
9. How do you provide information for the participation in the decision making process?
10. At last, would you please like to say anything that I have not asked you?

Appendix 6.Interview Questions to official of UTHEPL (Planning & detailed feasibility study group)

Interview Number……Date……
Name……Position……
Organisation.....Contact Information…….....
Objective: To obtain knowledge/experience and information on different aspects of land Tenure and UTHEP.

1. Was there any awareness program organized for the citizens before the development of project?
2. What results are expected from an increasing degree of participation by women in decision making, planning and implementation of the project?
3. How important do you think the role of community in planning and detailed feasibility studies?
4. What are the types of Government land occupied by this project? Multiple answers is possible

Ditches ☐ bushy land ☐ forest land ☐ others specify ……

5. Does this project try its best to minimize the use of land, which is one of the indicators to make the project environment friendly?
6. What do you think after hydropower development landscape will be changed?
7. Is there any public participation in planning and detailed feasibility study process of this hydropower project?
8. What were the advantages of public participation in planning and detailed feasibility study process?
9. How do you provide information for the participation in the planning process and detailed feasibility process?
10. Who are the stakeholders during the planning and feasibility study process?

Appendix 7.Interview Questions to official of UTHEPL (Site Manager)

Interview Number……Date……
Name……Position……
Organization/Department……Contact Information…….
Objective: To obtain knowledge/experience and information on different aspects of land Tenure and UTHEP.

1. What are your responsibilities as a site manager?
2. What will be the total Employment in the project?
3. How many people will be from local area? Total women employees? If low why?
4. How do you manage the complaint and claim of the affected families?
5. Is there any institution formed during land Acquisition process?
6. Who are the key stake holders and what are their interests in this project?
7. What role are they playing in land tenure for supporting hydropower development?
8. Are there any community forest user groups in the area?
9. How many houses they acquire for hydropower development?
10. How will you manage the quarry site during construction?
11. What are the land conflicts you have experienced in this project?
12. How do you solve this conflict?

Appendix 8.Interview Questions to official of UTHEPL (Design/Site Engineer)

Interview Number……Date……
Name……Position……
Organization/Department……Contact Information…….
Objective: To obtain knowledge/experience and information on different aspects of land tenure in design and implementation stages of development UTHEP.

1. What are the responsibilities of Design/site engineer?
2. How will hydropower development in the area effect on environment?
3. How do you informed people about compensation for land acquisition?
4. How do you involve public participation in design/ implementation?
5. Is public participation important during land acquisition for hydropower development?
6. How were the citizens, communities involved in the process of design/ implementation?
7. What is the approach of involving citizens, community in process of design/implementation?
8. What is your opinion about the hydropower project in the area? Does it provide benefit to society?
9. Is there any National policy on resettlement to Hydropower development?
10. What is the resettlement process and compensation Procedure during land acquisition for hydropower development?
11. Is there any local resettlement during land acquisition for hydropower development? Which one is mostly affected?
12. What will be the possible land conflict during development of hydropower project? How will you solve it?
13. What do you think after hydropower development landscape will be changed?

Appendix 9.Interview Questions to Environmentalist

Interview Number……Date……
Name……Position
Organization/Department……Contact Information…….
Objective: To obtain knowledge/experience and information on environmental aspects of UTHEP.

1. What are your responsibilities as an environmentalist in this project?
2. How Does this project effects on the environment?
3. What are the mitigation measures for the protection of the environment?
4. How does this hydropower project acquire the land for the project?
5. Is there any resettlement for any household in this project, where do you resettle this people?
6. Don't you think that Resettlement process creates deforestation and degradation of land?
7. Does this project involve EIA during the development of the project?
8. Where do you dispose the sewage from the labour camp?
9. What are the conflicts you have experienced in this project?
10. How do you solve it?
11. What are the special features of this project based on environment?
12. Do you want to say anything that I have not asked you?

Appendix 10.Interview Questions to Civil society member

Interview Number……Date……
Name……Position……
Organization/Department……Contact Information…….
Objective: To obtain knowledge/experience and information on different aspects of land tenure in UTHEP for social and environmental effects.

1. Is there any program undertaken by UTHPL to improve the standard of living of the local communities? Please specify……..
2. Did affected families face any problem in receiving the compensation?

Yes ☐ No ☐ don't know ☐

3. Did they provide affected families enough time to carry crops and materials?

Yes ☐ No ☐ don't know ☐

4. Do affected families satisfy with the compensation amount?

Yes ☐ No ☐ don't know ☐

5. How do they use this compensation amount?

Please specify……. (Buy alternative land or something else)

6. What are the land conflicts that are created in this project (Multiple answer is possible)

Boundary conflict ☐
Low compensation and unfair compensation ☐
Resettlement (mix of resettle+ host population) ☐
Disposal of muck ☐
Ownership conflict ☐
Conflict by blasting during tunnel construction ☐
Land use conflict ☐

7. In your opinion how the conflicts are resolved?

Withdraw☐ compromising☐ confronting☐ forcing☐ smoothing☐ Negotiating☐
any other specify……

8. Do people not having legal land certificate get compensation easily?

Yes ☐ No ☐ don't know ☐

9. Are there any criteria to provide employment to PAF? How many people are working as employee from local area?
10. Is there any awareness program on environment and waste management by the project owner?
11. What are the other benefits you expect from this hydropower project?
12. Which are the villages mostly affected by hydropower project?
13. The hydropower project may pass through various cultural sites, Do these issue is focused while designing hydropower project?
14. What type of cultural land is affected by this hydropower projects like temple, meeting place, religious place and others?
15. What are the types of Government land: ditches, bushy land etc. allocated for this project?
16. How did project owner provide the compensation for those who do not have legal certificate?
17. Do you know how they have managed air and sound pollution during construction of project?
18. Hydropower development in your village increases the employment opportunity? Do you agree with this?
19. Are there any effects because of tunnel excavation and blasting in the project area?
20. Is there any environment mitigation measures undertaken by the project?

Appendix 11.Interview Questions to Survey Office

Interview Number……Date……
Name……Position……
Organization/Department……Contact Information…….
Objective: To obtain knowledge/experience and information on various transaction statuses after UTHEP.

1. Do all the parcels register within the project area?
2. How do these hydropower projects provide compensation for the people not having certificate?
3. Is there any change in number of registration because of this project?

- Buying and selling
- Transferring

4. What type of land is mostly used by this hydropower project?

Private land ☐ government land ☐ Trust land ☐ communal land ☐

5. What are the effects of the land price rise in the affected area?
6. What type of problems rose while acquiring land for this hydropower project?
7. How did you solve the problem?
8. Are the problems discussed with the land owner?

Appendix 12.Interview Questions to ICIMOD

Interview Number……Date……
Name……Position…….
Organization/Department……Contact Information…….
Objective: To obtain knowledge/experience and information on effects to environment by hydropower development activities

1. What are the major responsibilities of ICIMOD?
2. How development activities like hydropower project effects on environment?

- Land degradation
- Deforestation

3. How much importance should be given in the environment aspects during the development of the hydropower project?

Appendix 13.Interview Questions to CDO of Dolakha District

Interview Number……Date……
Name……Position…….
Organization/Department……Contact Information…….
Objective: To obtain knowledge/experience and information on different aspects of land Tenure in UTHEP.

1. As a member of compensation fixing committee, what do you feel about the compensation procedure?
2. Which compensation procedure do you find easier for acquiring the land in this project?
3. In your opinion after the development of the project the migration of the people from rural to urban will be stopped?
4. What are the various conflicts that you have encounter during the development of this hydropower project?

Appendix 14.Interview Questions to VDC Heads

Interview Number……Date……
Name……Position……...
Organization/Department……Contact Information…….
Objective: To obtain knowledge/experience and information on UTHEP and its effects on the village.

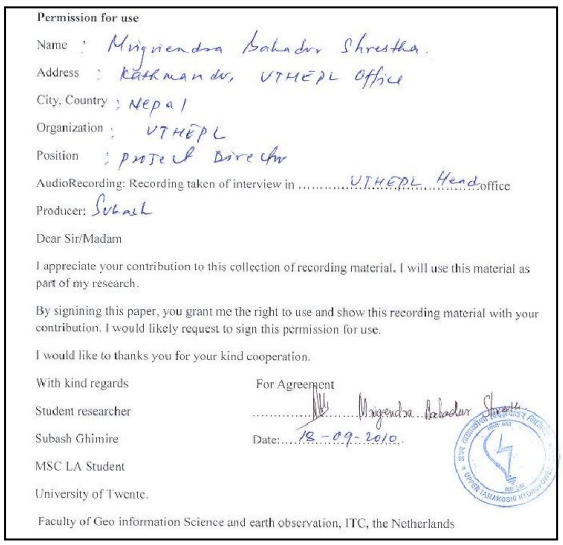
1. How many (numbers or %) households are affected in this village by hydropower projects?
2. In which phase of the project are you involved?

Political decision making ☐ Planning and feasibility study ☐ Design ☐
Implementation ☐ Others……

3. What was your role?
4. How do this village support in developing this hydropower project?
5. What are the effects by this hydropower projects in this village?
6. Do you think living standard of the villager is/ would increase by this project? If yes How?
7. What is your role in this project?

Positive role and cooperation ☐ Just Support ☐ protest ☐ non-support ☐ any others

Appendix 15.Ethical consideration: sample of Consent for use of recorded material



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Name : Mrigendra Bahadur Shrestha.
Address : Kathmandu, UTHEPL Office
City, Country : Nepal
Organization : UTHEPL
Position : project Director
AudioRecording: Recording taken of interview in ..... UTHEPL Head office
Producer: Subash

Dear Sir/Madam

I appreciate your contribution to this collection of recording material. I will use this material as part of my research.

By signining this paper, you grant me the right to use and show this recording material with your contribution. I would likely request to sign this permission for use.

I would like to thanks you for your kind cooperation.

With kind regards
Student researcher
Subash Ghimire
MSC LA Student
University of Twente.
Faculty of Geo information Science and earth observation, ITC, the Netherlands

For Agreement
.....Mrigendra Bahadur Shrestha
Date:.....18-09-2010.