

IMPACT ASSESSMENT OF KHUDI HYDROPOWER PROJECT

**A thesis submitted to the Faculty of Humanities and Social Sciences,
Central Department of Sociology/Anthropology,
in partial fulfillment of the requirements for the
Degree of Master of Arts in Sociology**

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APPROVAL

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This study entitled “**Impact Assessment of Khudi Hydropower Project**” is for the partial fulfillment of the requirement of the Master’s Degree in Sociology of the Central Department of Sociology/Anthropology, Tribhuvan University. The study is mainly focused on the socio-economic and cultural impacts of the Khudi Hydropower Project in the project affected VDCs.

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TABLE OF CONTENTS

Recommendation Letter	ii
Approval Letter	iii
Acknowledgement	iv
CHAPTER- 1	1
Introduction	1
1.1 General Background.....	1
1.2 Statement of Problem.....	3
1.3 Objective of the Study.....	4
1.4 Importance of the study.....	4
1.5 Conceptual Framework	5
1.6 Operational Definitions.....	6
1.7 Organization of the Study	8
CHAPTER- 2	10
Literature Review	10
2.1 History and Development of Hydro Plants	10
2.2 Perspective Energy Plan (Tenth Five Year Plan- 2001/02 - 2006/07).....	11
2.3 Three Year Interim Plan (2007/08 – 2009/10).....	12
2.4 Review of Selected Literatures	17
CHAPTER -3	28
Research Methodology	28
3.1 Research Design.....	28
3.2 Rational of Selection of Study Area.....	28
3.3 Nature and Source of Data	29
3.4 Universe and Sampling Process.....	29
3.5 Methods of Data Collection	30
3.5.1 Semi Structural Interview.....	30

3.5.2 Key Informant Interview	31
3.5.3 Observation	31
3.6 Data Analysis and Interpretation.....	32
3.7 Limitation of Study	32
CHAPTER-4	34
Survey, Data Analysis and Major Findings	34
4.1 Introduction	34
4.2 Socio-Economic Characteristics	34
4.2.1 Age Sex Composition and Education Structure.....	34
4.2.2 Ethnic/Caste Composition.....	38
4.2.3 Occupational Status of the Respondents	40
4.2.4 Livestock Situation in the Sample HHs	41
4.2.5 Land Tenure	43
4.2.6 Annual Income Level	45
4.2.7 Migration Pattern.....	47
4.2.8 Expenditure Characteristics.....	48
4.3 Energy Use Pattern.....	50
4.3.1 Fuel and Fodder.....	50
4.3.2 Main Energy for Lighting Purpose	51
4.4 Socio-Economic Impact of the Project	53
4.4.1 Time Consumption for the Purchase of Kerosene	53
4.4.2 Drinking Water Facilities	54
4.4.3 Sanitation (use of toilet).....	56
4.4.4 Health Facilities.....	57
4.4.5 Involvement in the Vocational Trainings.....	59
4.4.6 Employment Opportunities	60
4.4.7 Decision Making Pattern.....	61
4.5 Economic Analysis: Correlation between Income level and electricity use after Khudi Project.....	63
CHAPTER- 5	66
Summary, Conclusion and Recommendations	66

5.1 Summary	66
5.2 Conclusion.....	70
5.2 Recommendations	71
5.2.1Law	72
5.2.2Pre and Post Project Impact Assessment	72
REFERENCES	73

LIST OF TABLES	PAGE
Table 4-1 Population Distribution by Age and Sex	35
Table 4-2 Education Status by Sex.....	37
Table 4-3 Ethnic/Caste Composition.....	39
Table 4-4 Occupational Status of the Respondents.....	40
Table 4-5 Livestock Situation in the Sample HHs	42
Table 4-6 Size of Land Holding	44
Table 4-7 Distribution of Respondents by Annual Income.....	46
Table 4-8 Distribution of Sample HHs by Migration Pattern	47
Table 4-9 Expenditure Characteristics	49
Table 4-10 Energy Use Situation.....	51
Table 4-11 Energy Use Pattern of Lighting	52
Table 4-12 Time spent for purchase of kerosene before the project.....	53
Table 4-13 Energy for Lighting Purpose after the Project	53
Table 4-14 Drinking Water Facilities before the Project	54
Table 4-15 Drinking Water Facilities after the Project	55
Table 4-16 Sanitation Facilities before the Project	56
Table 4-17 Sanitation Facilities after the Project	57
Table 4-18 Time Spent for Health Facility before the Project.....	58
Table 4-19 Time Spent for Health Facility after the Project.....	58
Table 4-20 Households involved in Vocational Trainings before the Project.....	60
Table 4-21 Households involved in Vocational Trainings after the Project	60

Table4-22 Number of People Employed in the Project Construction Activities	61
Table 4-23 Decision Making Pattern before the Project	62
Table 4-24 Decision Making Pattern after the Project.....	62
Table 4-25 Correlation calculation of income level and use of electricity	64

LIST OF FIGURES **PAGE**

Figure 1-1 Conceptual Framework of the Study	5
Figure 1-2 Khudi Hydropower Project Location.....	7
Figure 4-1 Population Distribution by Age and Sex.....	28
Figure 4-2 Education Status.....	30
Figure 4-3 Ethnic Distribution.....	31
Figure 4-4 Occupational Status of the Respondents	32
Figure 4-5 Livestock Situation.....	34
Figure 4-6 Land Distribution Pattern.....	35
Figure 4-7 Distribution of the Sample Households by Annual Income...36	
Figure 4-8 Migration Pattern.....	38
Figure 4-9 Annual Expenditures.....	39
Figure 4-10 Energy Use for Cooking.....	40
Figure 4-11 Energy Use for Lighting	41

APPENDICES

APPENDIX A **Household Survey Questionnaires**

ACRONYMS

ADB	Asian Development Bank
CBRM	Community Based Resource Management
COPPADES	Committee for Promotion of Public Awareness and Development Studies
EIA	Environmental Impact Assessment
EPA	Environment Protection Act
EPR	Environment Protection Rules
ESCAP	Economic and Social Survey of Asia and the Pacific
FY	Fiscal Year
GDP	Gross Domestic Product
GoN	Government of Nepal
HHs	Households
ICIMOD	International Centre for Integrated Mountain Development
JIBIC	Japanese Bank for International Cooperation
KHL	Khudi Hydropower Limited
KHP	Khudi Hydropower Project
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt hour
LPG	Liquefied Petroleum Gas
MW	Megawatt
MTEF	Medium Term Expenditure Framework
NGO	Non Governmental Organization
MVA	Mega Volt Ampere
NEA	Nepal Electricity Authority
NPC/N	National Planning Commission-Nepal
PRSP	Poverty Reduction Strategy paper
OPEC	Organization of Petroleum Exporting Counties
REDP	Rural Energy Development Program
UNDP	United Nation Development Program
US	United States
USSR	Union of Soviet Socialist Republics
VDCs	Village Development Committees
WECS	Water and Energy Commission Secretariat

CHAPTER- 1

Introduction

1.1 General Background

From long ago, Rivers have always sustained livelihoods of the peoples through the utilization of different natural resources available in the basin. All over the world, many Rivers have been dammed in the spirit of performing various purposes: agricultural irrigation, domestic water supply, and flood control or power generation.

Water as a natural resource is used for multiple purposes in households, industries, mining, tourism, farming, and power generation. Its determinant role in development policy planning and international relations between countries is obvious. However, societies and communities can be adversely affected by development schemes and hence evolve in disruption, if appropriate measures are not taken in to consideration from early planning. Open and inclusive participation and transparency in decision-making process are proposed by scientists and researchers as the new framework leading to improved projects management.

By the year 1980, the notion of hydropower related impacts on local economics, societal, cultures, livelihood security and environmental conservation has been emerged prominently. Nepal is facing an acute shortage of electrical power, though the country is said to be one of the hydro rich countries in the world. The socio-economic and environmental consequences of large hydro project, which were thought to be the instant remedy for the power crisis, attracted the attention of the government and policy makers over past few years. This combined with the lack of local finance and experience to build large hydropower project, made the

government to emphasize to promote the development of small hydropower projects by private and local parties to meet the power requirement of the country without waiting for large power projects to come. The small hydropower project was seen more economically and timely viable than large hydropower project. It is believed that these types of projects have minimum adverse effect on society and culture.

Nepal is blessed with abundant water resources combined with large geographical variations from High Himalayas to the plain of the Terai within a short distance. About six thousand Rivers and rivulets in Nepal carry about 225 billion cubic meter of water every year and flow down to Indian Ocean via India. The ample water sources and the geographical variants are extending immense hydropower potential in the country. Of the estimated 83,000 MW hydropower potential of the country, it has been assessed that 42,000 MW can be exploited economically. However, the under utilization of this vast resources has been due to various reasons including lack of consistent policy mechanism and project selection criteria, lack of basic infrastructures facilities, lack of technical and financial strengths of the country etc. Still traditional source of energy such as fuel wood, agricultural residue and animal waste is playing major role (86%) of total energy consumption of the country. Commercial energy sources like fossils fuel and electricity share remaining portion of the energy consumption, of which electricity contributes about 1.2 % of the total energy needs (Gurung, 2000).

This study is based on the Khudi Hydropower Project which is in commercial operation with a generating capacity of 4.0 MW since December 2006. This study is focused on the socio-economic and cultural impact of the project on the project sample VDCs.

The Area of Impact has been divided in two categories, depending on the proximity to the project site and the level of the impacts it has experienced. These categories are Project site or Direct Impact Area and Surrounding Area or Indirect Impact Area. The first category of impact area Include all the areas where activities directly related to the project will take place. In this area, the defined social, cultural and environmental components are directly affected by the project. The second category of the impact area consists of areas which are not directly affected by construction activities. The physical environment in this area will experience only indirect impact because the project does not directly cause any disturbances to the landscape. However, the activities of the construction workers and the supplying of goods for the increased population in project area and of raw material for project structures could indirectly disturb the biotic and social environment in this area.

1. 2 Statement of Problem

Nepal is a mountainous country with 42% (based on area of districts)¹ of the land covered by hill. Apart from being a land locked country, the uneven geography is said to be a major constraint for the development. One of the attentive sources of sustainable development in Nepal is hydropower, nevertheless the resource is still not harnessed in full fledge.

Different ideas like “10,000 MW in Ten Years” and “25,000 MW in Fifteen Years” have been devised for the development of hydropower in the country. However, the history of the development of hydropower projects is not encouraging. There are examples that these development projects are slacking up due to public concerns such as social, cultural

¹ Nepal in Figures 2006, GoN, National Planning Commission Secretariat, Central Bureau of Statistics

and economic impacts. Lack of assessment of socio-cultural and economic impacts of the hydropower has threatened their sustainability. An assessment of socio-cultural impact on of the project area has become essential for their smooth run. In this context, impact assessment of Khudi Hydropower Project could be an interest of study. Some of the major problems concerning this research are,

- Social structure and cultural values are likely to change due to the implementation of Khudi Hydropower Project in the affected areas. The assessment of these changes is one of the problems of interest for study.
- A wide range of positive and negative impacts on the society, economy and culture at the project influenced area of Khudi Hydropower Project are likely to occur due to its implementation. So, the assessment of these impacts is another prominent problem to be assessed in this research work.

1.3 Objective of the Study

The objectives of the study are as follows,

1. To describe the socio-cultural structures of the affected area of the Khudi Hydropower Project.
2. To assess the socio-economic and cultural impacts of Khudi hydropower project in the project area and its vicinity.

1.4 Importance of the study

This research work has mainly focused on the socio-economic and cultural impact of the Khudi Hydropower Project in the project affected areas. As the study has thoroughly described the general socio-economic status of the people and impacts due to the implementation of the project, this study will be very much useful for the future hydropower project to

mitigate the adverse impacts. This study is equally important to find out the major socio-economic changes that are likely to occur due to hydropower projects.

1.5 Conceptual Framework

This study is focused primarily to the assessment of the impacts generated by the Khudi Hydropower Project. Various impacts related to social, economic and cultural aspects have been identified. The social impacts such as marital status, education, health and decision making pattern of the study area have been identified and studied. Similarly, the cultural impacts such as marriage pattern and their beliefs on it in the area have also been identified and studied. Finally, the economic impacts generated due to the project activities have been included in this research work. The study has followed the conceptual framework as shown in Figure 1-1.

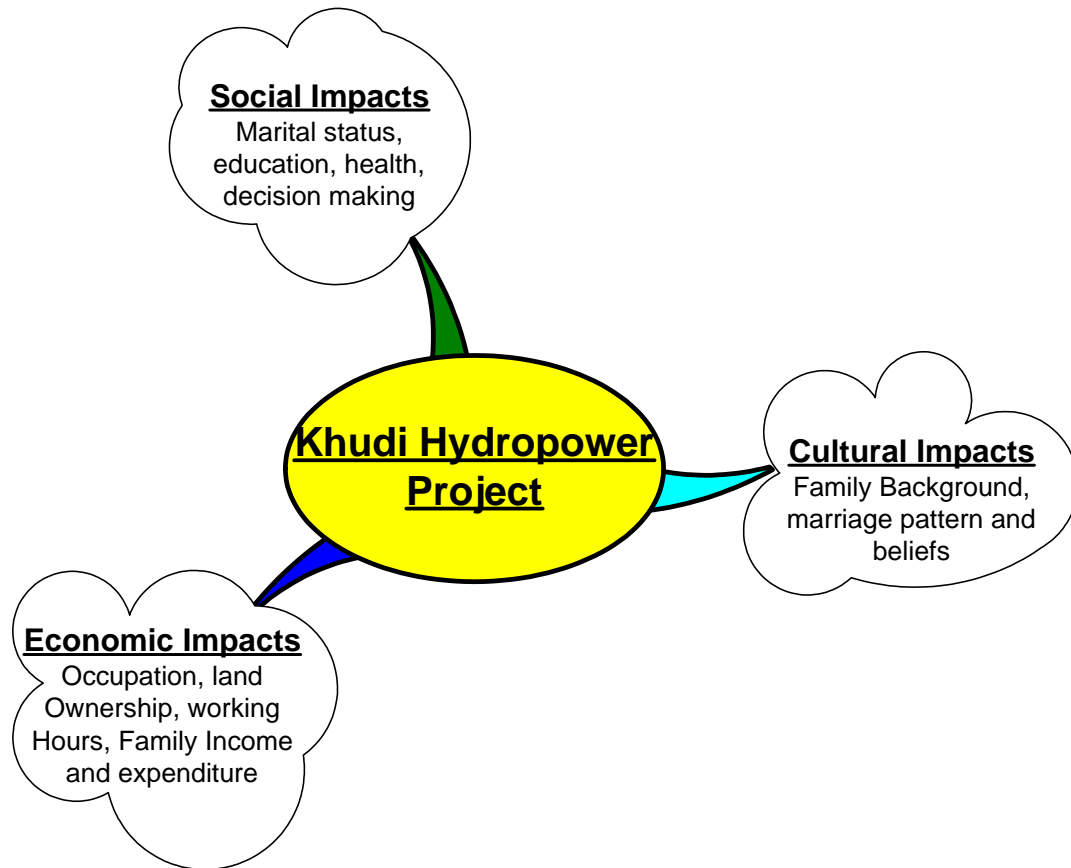


Figure 1-1 Conceptual Framework of the Study

1.6 Operational Definitions

Some of the basic terms and their operational definitions used in this thesis work are as follows:

- **Cultural values:** Commonly held standards of what is acceptable or unacceptable, important or unimportant, right or wrong, workable or unworkable, etc., in a community or society.
- **Economic impacts:** Economy-wide (macroeconomic) effect on employment and incomes produced by a decision, event, or policy.

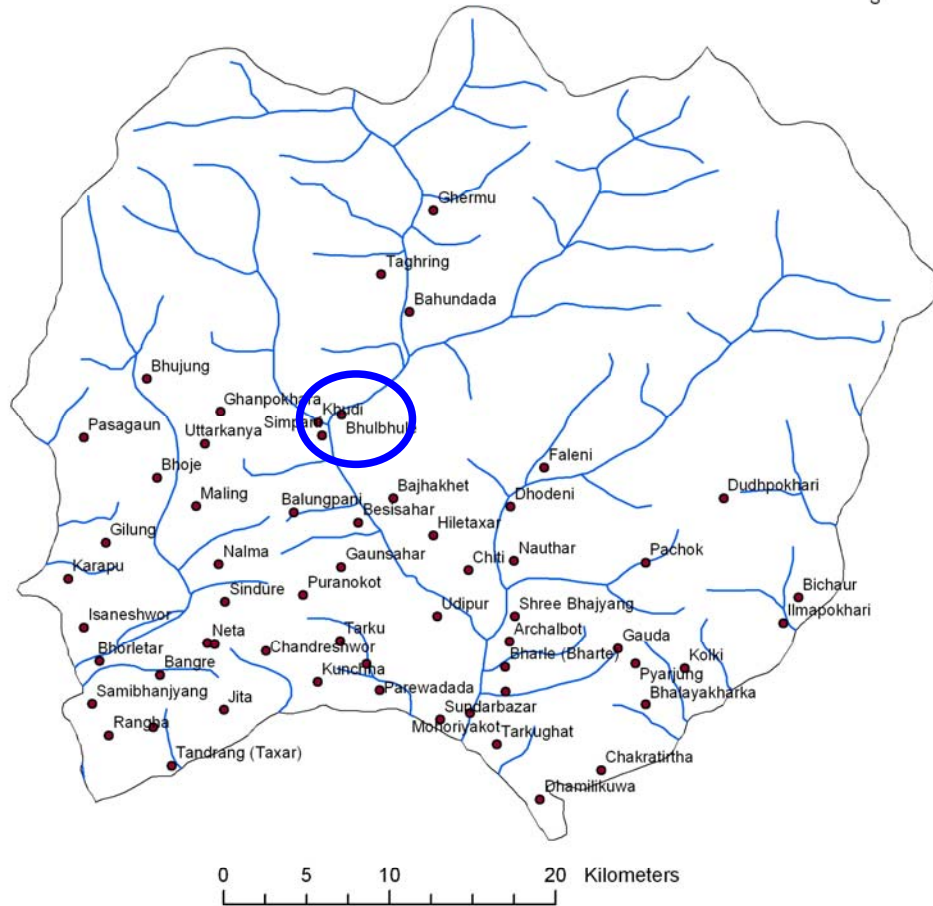
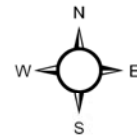
- **Ethnic group:** a group of humans whose members identify with each other, through a common heritage that is real or presumed.
- **Qualitative data:** data that are described in terms of quality.
- **Quantitative data:** data that are described in terms of quantity.
- **Rituals:** a set of actions, performed mainly for their symbolic value, which is prescribed by a religion or by the traditions of a community.
- **Socio-cultural Impact:** Effect of an activity on the social and cultural fabric of the community and well being of the individuals and families.
- **Socio economic inequality:** all disparities in the distribution of economic assets and income.
- **Social inclusion:** inclusiveness and rights of people in basic needs, and resources.
- **Social structures:** enduring relationships or bonds between individuals or groups of individuals.
- **Structured interview:** quantitative research method commonly employed in survey research.
- **Sustainable development:** a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for future generations.
- **Vicious circle:** a complex of events that reinforces itself through a feedback loop toward greater instability.

1.7 Organization of the Study

This dissertation entitled “Impact Assessment of Khudi Hydropower Project” has been divided into five chapters in order to make the study coherent and more systematic. The first chapter bearing a title of Introduction includes general background, statement of problem, objectives of the study and the importance of study, followed by the organization of study. The second chapters entitled Literature Review includes the different ideas and results from various publications along with web sites relevant to the study. Followed by this is the chapter named Research Methodology which describes the various techniques adopted for the collection, analysis and presentation of primary and secondary data. The fourth chapters with heading named as Survey, Data analysis and Major Findings introduces the study area, its socio-economic and cultural standing before and after the project with the presentation of analyzed data and findings in tabular/graphical forms. Finally the fifth chapter is Summary, Conclusion and Recommendation presenting the result of the study in a concise manner. Besides, the study also includes the references and appendices at the end.

Lamjung District

लमजुङ



Legend

- River
- Village Development Committee (VDC)



Figure 1-2 Khudi Hydropower Project Location

CHAPTER- 2

Literature Review

2.1 History and Development of Hydro Plants

The first hydropower plant in Nepal, 500 kW Pharping power plant, was installed in 1911 AD at the time of the then Rana regime to electrify palaces of Rana. It took almost three decades to bring another plant, 640 kW Sundarjal power plant in 1936 AD. The third hydropower plant of capacity 2.4 MW was installed at Panuati in 1965 AD. As the electricity demand increased mainly onwards from 1960's, some bigger sized plants were constructed with assistance from India and China (*Gurung, Bimal, 2000*).

Prior to 1960, all hydropower stations were constructed through grant/aid from friendly countries like former USSR (Panauti), India (Trishuli, Devghat, Gandak/ Surajpura) and China (Sunkoshi). Since 1970, hydropower development took a new turn with the availability of bilateral and multilateral funding sources. The major donor countries in that period were Japan, Germany, Norway, South Korea, Canada, Finland, Denmark, Sweden and USA. The financial lending agencies were the World Bank, Asian Development Bank (ADB), Japanese Bank for International Cooperation (JIBIC), Saudi Fund for Development, Kuwait Fund, OPEC and others. In 1975, Small Hydro Development Board was established in order to electrify district administrative centers lying in remote areas through isolated small-scale hydropower projects (*Gurung, Bimal, 2000*).

Rapid development of urban areas and establishment of industries with the population growth, electricity supply became deficit during late 1980's and the early 1990's which forced Nepal Electricity Authority (NEA) to start a process of load shedding in the country. In order to cope up increasing electricity demand, the Government of Nepal decided to

open its doors in 1992 to the private sectors involving both national and foreign investors for the speedy hydropower development. Private sector hydropower projects such as Khimti, Bhotekhosi and Indrawati materialized as a consequence of introduction of that policy. In order to encompass projects of various scales intended for domestic consumption as well as to export hydropower, the previous policy was replaced by the Hydropower Development Policy 2001 to provide further impetus to the active participation of private sector. (*Gurung, Bimal, 2000*).

2.2 Perspective Energy Plan (Tenth Five Year Plan- 2001/02 - 2006/07)

Development follows the social upgrading where effective utilization of social groups as human resources share equally in the development efforts and in the distribution of benefits. Many government as well as international agencies now realizes that socio-cultural and economic impacts are inevitable in the development process. So, the assessment of impacts and their mitigation is not just a means of creating social harmony but one of the necessities for the national and international progress.

The tenth plan was the Poverty Reduction Strategy paper (PRSP) of the country and was aimed to the reduction of poverty as the overriding objectives. The PRSP, which was evolved in a participatory approach, was more focused and realistic as compared to earliest plans. It had set four prolonged strategies to achieve the goals and targets of reducing human and social exclusion aspects of the poverty. This is based on the context of reducing adverse impacts of the development projects like hydropower. Thus, the 10th plan is in a circumference of impacts of development projects which need to be assessed and mitigated by various approaches like participation and inclusion.

Table 2-1 Indicative Targets of Ninth and Tenth Plan

Ninth plan ends 2001/2002			Tenth Plan ends 2006/2007		
Description	Target 2001/2002	Achievement	Description	Normal Case	Lower Case
Electricity supply capacity	598 MW	584.5 MW			
Population Benefiting from electricity	20 %	40 % (including 7 % from alternative energy)	Population having electricity	55 %	53 %

Source: District development Profile of Nepal, 2004 Informal Sector Research and Study Center

2.3 Three Year Interim Plan (2007/08 – 2009/10)

The importance and contribution of electricity in the development of agriculture, tourism, and industries, and other social and economic sectors, is well established, this is what the three year interim plan (2007/08-2009/10) writes emphasizing on the development of hydropower for the socio-economic development of the country. The studies undertaken to date have shown that the feasible potential is 83,000 MW. Of this, development of 42,000 MW has been considered as technically and economically viable. The actual generation capacity of hydropower is only 556.4 MW. This is 0.67 percent of feasible generation potential. Of this, public sector contribution is 408.1 MW and 148.3 MW comes from the private sector.

Private sector investment in the development of electricity was significant in the Ninth Plan period. In the Tenth Plan period, however, the investment of the private sector was not encouraging. The government

sector also failed to make investment in this sector during the plan period. The capacity of electricity power generation is not sufficient to meet even the domestic demand in the absence of effective investment plan, at present. In this context, the possibilities of hydropower export and its contribution to overall economic development of the country, continues to remain as the major challenge. The Three Year Interim Plan intends to develop the hydropower potential of the country as an export commodity, expanding hydropower to the rural areas and providing quality services with low investment, within the framework and perspectives of the Hydropower Development Policy, 2001 and the National Water Plan, 2005.

Reviewing the current situation, this unofficial translation document prepared by National Planning Commission, Government of Nepal writes; of the total population, 48.5 percent was expected to have access to electricity services by the end of the Tenth Plan. Prior to the Tenth Plan, electricity was available to 58 municipalities and 1600 VDCs in the country. A total of 2,100 VDCs were expected to have access to electricity services, at least partially, by the end of the Tenth Plan. Electricity supply has been expanded to cover 59 Districts in the country. In the Community Rural Electrification Program, initiated during the Tenth Plan period, people's participation in the expansion of electricity supply has been encouraging. The per capita electricity consumption has currently increased to 76 kWh. The peak electricity demand of 426 MW towards the end of Ninth Plan increased to 648 MW towards the end of Tenth Plan period. As a result of this, load shading at present has become inevitable. Water Resources Strategy, and in order to undertake effective implementation of this strategy, the National Water Plan, were formulated during the Tenth Plan period. The installed generation

capacity of the hydro and thermal power plants towards the end of Tenth Plan, as shown in Table-2-2, does not reflect satisfactory progress in comparison to the targets that were set. In hydropower sector, only 40 MW were added during this period and that all of this has been done under the initiative of the private sector.

Table 2-2 Targets and Achievements in the Tenth Plan Period and Existing Status

Sector	Unit	Target	State of progress	State as of F.Y. 2063/64
Installed Capacity-Hydropower	MW	315	40	556
Transmission Line (132 and 66 kV)	Km	430	47	2669
High Capacity Sub-Stations (132 and 66 kV Capacity)	M.V.A	426	332	1,089
Transmission Line (33 kV)	Km	865	123	2,485
33/11 KV Capacity Sub-Station	M.V.A	101	112	245
Distribution Line (11 kV and 400/230 Volts)	Km	14,917	8,672	49,930
VDCs with Access to Electricity	Number	2,600	2,100	2,100
Number of Consumers	NA	706	417	1,280
Beneficiary Population	Percent	10	8.5	48.5

Source: Three Year Interim Plan (2007/08 – 2009/10), Unofficial Translation, NPC/N

The objective of this plan is to create an environment conducive to domestic and foreign investment in the development of hydropower and to ensure reliable, quality and easily accessible electricity services for majority of the people of the rural areas of the country, considering hydropower as an important base for the comprehensive economic development of the country (*NPC/N, 2007*). Thus, the Three Year Interim Plan has stated the importance of hydropower projects and is focused on the sustainable development of such projects by emphasizing the assessment of impacts such as social, cultural, and economic in the local communities.

Economic and Social Survey of Asia and the Pacific 2008, Sustaining Growth and Sharing Prosperity published by United Nations (ESCAP) focusing the socio- economic status of Nepal writes; in Nepal optimism followed the restoration of peace and security in 2007. But economic activities did not improve much. GDP growth slowed further in 2007, to 2.7 %. Growth in the agricultural sector was marginal, at just 0.7 %, while non-agricultural sector growth stood at 3.6 %. Harsh weather devastated agricultural production, particularly the paddy crop. But the services sector remained fairly buoyant, growing by 4.1 % with the rapid expansion of transport, telecommunication and mobile telephone service.

In contrary, this report also figure out stating that Bhutan's trade balance improved in 2007, with large export of electricity to India and much of the Tala hydropower project coming on stream. The country's current account balance turned to a surplus in 2007, and is expected to remain a surplus in near future. In Bhutan the construction of two new hydropower projects will help to sustain real GDP growth over the medium term. GDP is expected to grow about 10 % in 2008. Ironically, expressing the

Nepalese scenario this report adds; in Nepal with the peace process moving forward, GDP growth is expected to increase to 4% in 2008. Tourism, services and transportation appear to be reviving. More government spending could support economic activity, as budgetary capital spending on rural infrastructure is expected to pick up. But since Nepal is still in transition politically, its economic situation remains vulnerable.

Furthermore, mentioning the medium-term challenges it writes, the main challenge for countries in South and South West Asia is to sustain their growth momentum in the face of high oil prices. Should oil prices remain very high, they will compromise economic growth while putting pressure on budgets, inflation rates and the balance of payments in countries throughout the sub region. So, some measures must be taken to hedge the risk of continued high oil prices and- more importantly – to contain oil imports through selective energy conservation measures (*ESCAP 2008:86-87*).

Table 2-3 Energy and water use in the South Asia

Countries	Consumption of electricity for Domestic Purposes (Kilowatts-hrs .per capita)		Energy use per \$ 1000 (2000 PPP) GDP KGs. of oil equivalent			Water withdrawal					
						Share of total renewable water resources (%)			Withdrawal for domestic purposes (cubic meter per capita)		
Year	2000	2004	1990	2000	2004	1988-1992	1993-1997	1998-2002	1990	1995	2002
Afghanistan	5	5						35.8			20.3
Bangladesh	39	55	103	94	93			6.6	15.0	32.5 ⁽⁹⁴⁾	18.1
Bhutan	54	69						0.4			35.8
India	72	86	257	213	186	26.4		34.1	29.1		49.9
Maldives	161	231									
Nepal	22	26	293	252	249			4.8		11.6 ⁽⁹⁴⁾	12.3
Pakistan	149	178	246	246	242	69.9		76.1			22.7
Sri Lanka	93	116	138	121	124	19.5		25.2	11.4		16.0

Source: Economic and Social Survey of Asia and the Pacific 2008; Sustaining Growth and Sharing Prosperity, ESCAP, Table 27

From this report, what can be concluded is the importance of hydropower for economic development is paramount for underdeveloped countries like Nepal. However, volatile political situations for the development in Nepal are some of the constraints to slack up the hydropower development. Thus, it ultimately focuses on the positive impacts of hydropower, specifically the economic growth of the country.

2.4 Review of Selected Literatures

There are several sources dedicated to the impacts of hydropower projects on society and exploring the pre and post socio-economic and cultural status of the affected people. However, sufficient studies focusing

particularly on the issues and extent of social, cultural and economic impacts of small hydropower plants in the Nepalese context have been lacking so far. A very few books or research papers are published concerning the issues despite the consistent concerns expressed over more than a decades of sustainable development and natural resource management.

In this section, efforts have been made to present a brief review on some existing literatures and relevant studies concerning the issue. There have been some studies and feature articles as well as training papers concerning the issue both at national and international level.

Rai (2004) presented a paper on the Conference on International Agricultural Research for Development entitled *Hydropower Development in Nepal: Local Responses to Technology and Formal Institutions* explains the impacts of large hydropower projects on the community. This paper has disclosed the different impacts of hydropower on local people and its proper management of adverse impacts both during the compensatory and post-compensatory stages. It also tries to assess the changes due to hydropower projects such as influence and power within specified social structures (caste, class, and ethnic group and patron-client relationships) and how it is further used to affect resource distribution, both financial and non-financial. This has given the fed back into policy processes of large hydro by considering their impacts as Nepal readies itself for grand projects. Besides, it has helped set lessons for debating further on whether large dams are the answer to a poor country's development under the current institutional context.

This research paper has disclosed the prevailing impacts of hydro projects in the local area. Moreover, it has also revealed the different constraints

like institutional conditions such as categorization of affected people, outdated rules on compensation, non inclusion of indirect affectees in compensatory procedures and lack of strong consultation processes for creating the additional gaps in the dam intervened community and threatening the sustainable development.

Finally, this research has concluded that impacts are likely to be generated due to hydro projects in the local level. Participatory and interactive institutional processes need to be developed by proper assessment of adverse impacts.

Gurung (2004) presented a study paper; included in the *Energy for Sustainable Development in the Asia and Pacific Region: Challenges and Lessons learned from UNDP Projects* entitled *The Rural Energy Development Program as a model holistic rural development in Nepal* has also focused on the social mobilization and eventually on the assessment of impacts on the local people for the sustainability of energy related development activities in the rural areas.

Considering the contextual facts of socio economic inequality along with the peculiar geophysical diversity this paper has made a conclusion that social and economic inequalities, low growth rates, unbalanced development approaches, discrimination, exclusion, environmental deterioration and inappropriate policies lead to a vicious circle of poverty in Nepal.

Further this paper has described on the holistic approaches adopted on micro hydro and other renewable energy projects for their sustainability stating that the community mobilization as a part of mitigating the adverse impacts, is a major critical programmatic component of the Rural Energy Development Program (REDP). It has aimed to ensure that 99.9 %

of households in a program village to be participated and become beneficiaries.

Concluding, this has iterated on the importance of community mobilization to mitigate the adverse impacts of the rural energy development.

Rao (2004) in her study paper included in the *Energy for Sustainable Development in the Asia and Pacific Region: Challenges and Lessons learned from UNDP Projects* entitled *Participatory approaches to rural energy supply: A case Study of biomass energy for rural India* has also focused on the public participation for the mitigation of adverse impacts of energy related development activities. This study has stressed the use of participatory groups, linkages with local bodies and synergizing with government programs for the effective provision of energy services.

Finally, the paper has disclosed the various positive impacts of Energy Projects stating, “... modern energy options reduce the drudgery of household work as they reduce time taken for cooking, collection of fuel wood, and collection of drinking water and save time that potentially enhances household income from other activities”.

Nzeyimana (2003) in his research document entitled *Rusumo dam-social challenge in Kagera River Basin: Participation of affected people* has emphasized on the prevailing debates on the water right issues with the conclusion of the requirement of intensive assessment of impacts on the affected people for the sustainability in dam projects. This has assessed the projected hydroelectricity power station on Rusumo Falls, which is likely to cause tremendous impacts in the over populated Great lakes countries of Rwanda, Burundi and Tanzania. As Kagera river and its tributaries support natural habitats and social lives of hundreds of people

within the river basin, cultural and societal values need to be preserved as much as possible in order to insure the intergenerational equity.

This research paper has concluded that the appropriate method of settling the debates on the dam related projects is the comprehensive assessment of impacts on the affected people both on the planning and implementation phase. The suitable response is self mobilization by participating in decision making and participation means recording and valuating the social cost in economic terms properly. So the active participation of all interested stakeholders is a prerequisite to tackle the dam related impacts from different angle and backgrounds. The consultation sessions and workshops should be inclusive, extensive and involve the affected local people, business sector and investors; local and international NGOs, governmental agencies and other interested parties so that the adverse impacts of the Dam Projects are mitigated suitably.

Hamal (1995) presented a report which was published by *Water and Energy Commission Secretariat* explains the fact that rural and hill areas have under gone deforestation due to insufficiency of alternative energy, i.e. electricity and women over working in farm time consuming and non-monitoring and highly backwardness.

The author further explains that energy is required to fulfill day to day needs, which includes cooking, heating, lighting and productive activities such as transportation, irrigation, cottage industries etc. Energy shortage has been recognized as the major constraint in the socio economic development and it contributes to further deteriorate the environment, creating a vicious cycle in the rural life by deforestation. Women are the main user of household energy. They are the main persons responsible for collecting fuel wood or the managing of other energy sources such as doing crops residues etc. Deforestation has made the women's life harder.

The increasing walking distance to fetch fuel materials has proven to be a work burden. It can be concluded that the impacts of energy related projects such as hydropower has a tremendous effects on socio-economic aspects of the rural people, especially women.

Water and Energy Commission Secretariat (1998) published a final report of the task force on Rural Electrification Impact in Nepal. This is on the task force and impacts of rural electrification on Nepal. The main objective in this report was to investigate impact of rural electrification in order to create a database for future forecasting and to provide policy direction for future development. Rural areas across Nepal served from various generation sources were studied in this report. Investigations were made on the small hydroelectricity and private micro hydro power stations to determine operating characteristics.

This report concludes that the development of rural electrification should be undertaken by appropriate mitigation measures for the adverse impacts so that the sustainable development of the rural communities is possible.

Bagadion, Jr. (1999) in his book *Bending the Wind: Lessons from Mt. Makiling: Empowering People for Natural Resource Management* has assessed an in-depth analysis of impacts in the development projects related to natural resources and recommended for the participatory approach to mitigate the adverse impacts generated from natural resources management.

Writer in his book has criticized the general trend of taking a single variable *participation* alone in people's participation approach mentioning as: "... *indeed the success of a development project does not hinge on the participation variable alone*" to mitigate adverse impacts. Further to this, writer has defined the community based resource management (CBRM) to a management strategy for achieving a people

centered development where the locus of the decision making as regards the sustainable uses of resources in an area lies in the people residing in the communities of that area, or those people who have day to day access to these resources.

In his book writer has mentioned the Mt. Makiling experience and key variables to project success which, together formed a model of project success. Community needs, sense of ownership by the community, inputs, capacity, strategy, and leadership are the variables contributing to the success of project. These variables however do not by themselves explain, guarantee or determine project. Success derives from the way in which these variables interact. In a word the dynamic fit or equilibrium among these variable. The success or failure of community based natural resource management can be evaluated and predicted on the basis of the degree of dynamic fit of the variables. A high degree of fit was attained in the Mt. Makiling Project writer adds.

Concluding, in his book compiled as a piece of work experience, writer has emphasized on the assessment of project impacts and participation of the communities in the resources management and development activities for the sustainability, iterating on the judicious play of the key variables such as ownership by the community, inputs, capacity, strategy and leadership as a suitable mitigation measure.

Pokharel (2004) in a paper entitled *Adopting different approach for rural electrification through small hydro development in hilly areas of Nepal* has expressed his disagreement on the traditional approach of selecting attractive small hydro sites based on financial and technical parameters and to electrify the nearby communities; and mentions as,

”communities far from the project site are always facing the problems even though they have more serious needs. So it is important to evaluate the project's feasibility including social benefits”

His study of prioritising small hydro sites on the criterion developed accordingly as , giving less importance to the technical and financial parameters and high score for sustainability, affordability, willingness to pay, regional balance and system fit with respect to demand and supply revealed that the project having negative financial indicators because of high initial cost, however seemed to be attractive on socio-economic aspect; and concluded that if there is no project, situation will be very difficult. Moreover, on his paper writer has emphasized the importance of small hydropower projects stating as, “...Extension of small hydropower projects to rural areas away from district head quarters have not yet been realized mainly due to their poor economic and financial viability. Providing electricity to meet the energy needs of the rural poor through development of small hydropower has yet to be initiated. The efforts of the related promoting agencies have focused mainly in micro hydropower (up to 100 kW) development as one of the means to meet the energy needs of the rural population. In light of the above-mentioned facts, development of small hydropower projects appears to be appropriate solution for the rural electrification in the remote hilly areas of Nepal.”

Concluding, the writer points out, although the results of economic analysis of some of the small hydropower projects are not very encouraging, the economic indicators can be improved and viability of project may be enhanced if some productive end use program (positive impacts) of electricity, like agro-processing industries, repairing and workshop centres and other employment generating industries are introduced under small hydropower implementation package. Therefore,

small hydropower schemes should be considered as essential infrastructure from social perspective for the development of the country. It has several intangible positive impacts, such as health of the people, education for children, provision of opportunity for jobs and changes in life style.

Garcia (2000), in a paper entitled *Hydropower, a Good Alternative for Nepal: Challenges and Approaches* has started her writing stating that adverse impacts related to hydropower development can be serious and significant, leading to increased poverty, social dislocation, losses in fishery resources and declines in biodiversity among a host of other associated impacts. Adverse impacts are project-specific and are related to project design and the social, physical and biological environments of the project site as well as the mitigation measures implemented during both construction and operational phases of the project.

Focusing on the challenges related to socio-economic and cultural aspect writer states that local communities in various project areas have learned to stop work on projects (sometimes justifiably, sometimes not) and thereby have their needs or desires met. Maintaining good, clear and consistent communication with local communities is a critical. Good community liaisons cannot be overemphasized. Successful implementation of a hydropower scheme in rural Nepal requires excellent community relations. Construction projects are often stopped by local communities for reasonable and sometimes unreasonable causes. Without local support, or in extreme cases—strong police power, projects cannot go forward in the face of local opposition. Local communities recognize that construction of hydropower projects is a ready source of revenues that can be tapped for local projects such as road building, trail improvements, schools, temples, water supplies, rural electrification, etc.

In some cases, the demands are rational; but, in some cases, they are not. Communities are very much aware of the mitigation requirements spelled out in the various environmental and social documents and are quick to point out when they are not receiving what they interpret are required. Hydropower development should be structured so that it contributes to local poverty alleviation as well as national benefits. Unfortunately, there have been several instances when early commitments made by project proponents were not carried out. Affected communities are quick to point out the cases of unfulfilled promises and they become a long-term irritant that results in conflict between the project proponent and the communities.

Suggesting the remedies measures for such issues writer has suggested some approaches mentioning that it is important to present project construction and operation in terms of how local communities will benefit. As part of Public Outreach Programs, the benefits and commitments should be made clear. Avoiding false promises is paramount. Besides the standard requirements for just compensation for the taking of land, buildings and other resources, the generalized measures as suggested are providing facilities of rural electrification, telecommunication and local infrastructure development. Moreover, local hiring during construction, involving local people as community liaison and availing the environmental impact documents in local language are also important for the sustainable development.

Review of literature reveals the importance of hydropower projects for human and economic development. Hydro electricity is a renewable, reliable source of energy and its development should not be considered in isolation from the general requirements of the community. No other source of energy other than hydropower can deliver multi –pronged

benefits. The development of hydropower can ensure energy security, provide food security and health security and, in addition, preserve environment, reduce greenhouse gas emission and create recreational facilities.

The over-arching goal of sustainable development in Nepal is to expedite a process that reduces poverty and provides to its citizens and successive generations not just the basic means of livelihood, but also the broadest of opportunities in the social, economic, political, cultural, and ecological aspects of their lives (*The Sustainable Development Agenda for Nepal, 2003*).

Nevertheless, some major problems concerning the hydropower development are prominent. Changes have been found on socio-economic and cultural status of the people. More specifically, cultural values are changing in the hydropower project area. Women, *Dalits*, and disadvantaged groups are marginalized by the projects activities in most of the cases. A wide range of positive and negative impacts on the society, economy and culture of the project influence area are found to be of prominent importance of the concerned hydropower project. These adverse impacts are to be addressed and mitigated in an inclusive manner for the sustainability of the projects.

CHAPTER -3

Research Methodology

3.1 Research Design

A research design is an organized approach and an integrated system that guides the researcher in formulating, implementing, and controlling the study. Among different research design types this research work uses the descriptive and comparative research design.

3.2 Rational of Selection of Study Area

Nepal is facing an acute shortage of energy in recent years. After the amendments made on the different acts and regulations private sector has been increasingly participating on the hydropower development.

The rational behind the selection of the study area is mainly due to the personal interest of the researcher as the project area lies in the Lamjung where the researcher was born. Moreover, an added advantage for the research work is expected to be fruitful due to the involvement and partial exposure of the researcher in the project and its vicinity. Besides, the technical knowledge of the researcher in the water resource management especially in hydropower domain in Lamjung district is also an important factor for the selection of this area.

For the purpose of this research, the area of impact was established to be confined into a radius extending to approximately 1 km from the project sites, hence including the following eight settlements, namely: Pallotari, Khudi Bazaar and Tarapu of Khudi VDC, Paikhola and Mirje Tole of Ghanpokhara VDC and finally Tallopachowk, Tabai and Dhaad of Simpani VDC.

3.3 Nature and Source of Data

Nature and source of data sampling is that part of statistical practice concerned with the selection of individual intended to yield some knowledge about a population of concern, especially for the purposes of statistical inference.

Principally, the natures of the data in this research are both qualitative and quantitative. Data like degree of participation in the decision making process, personal behaviors in the development activities, attitude towards the project activities, etc. are of the qualitative nature. Similarly the data like age, economically active population, and numbers of affected and beneficiary people from the project activates, numbers of ethnic people, etc. are categorized as the quantitative.

Likewise, the sources of the data in this research are both primary and secondary collected through various techniques. Primary data have been collected by the researcher personally conducting the field survey with the help of semi structured interview and key informant interview while the secondary data have been collected from various published and unpublished books, articles, writings of other people , different journals and web site.

3.4 Universe and Sampling Process

The project lies within the Khudi, Simpani and Ghanpokhara Village Development Committees (VDC) which is the main study area of this research. The major settlements near the project area are Pallotari and Khudi Bazaar of Khudi VDC and Paikhola of Ghanpokhara VDC. Besides, the settlements like Tarapu of Khudi VDC, Tallopachok, Tabai and Dhaad of Simpani VDC and Mirje of Ghanapokhara VDC are the other affected settlements of the project area where the sampling has been carried out.

Out of the total 481 households of all these VDCs only 98 households (about 20 % of the total households) from each settlement have been taken as the sample for the survey. Every effort has been made while choosing the survey sample in order to establish the inclusive characteristics of the affected groups on the basis of ethnicity. Moreover, for making inclusion of all the stakeholders of the affected area, interviews with key informants of local authorities and non-governmental organizations has also been conducted during the field survey.

3.5 Methods of Data Collection

Data collection is a term used to describe a process of preparing and collecting data. No study can be completed satisfactory until and unless the data are properly collected. Limited by the choice of time horizon, a lot of the data used in the research is likely to be secondary in nature. Nevertheless, an intensive use of primary data has also been made in this research.

For all components of socio-cultural and economic; data collection initially involved the collection of secondary data in the form of published and unpublished reports, VDC profile, articles, websites etc. available from different governmental and non-governmental organizations and libraries. Similarly, primary data are collected by observation, questionnaires, semi structured interview and key informant's interview of respondents from the sample unit.

3.5.1 Semi Structural Interview

A semi-structured interview is a method of research used in the social sciences. While a structured interview has a formalized, limited set question, a semi-structured interview is flexible, allowing new questions to be brought up during the interview as a result of what the interviewee

says. The interviewer in a semi-structured interview generally has a framework of themes to be explored.

A series of semi structured questions related to the Khudi Hydropower project's socio-economic and cultural impacts and the mitigation measures were constructed.

The questionnaires for the interview were prepared in such a way that it will cover all the data regarding family's socio-economic and cultural aspects and other development situations before and after the implementation of the project.

3.5.2 Key Informant Interview

The key informant interviewees are those respondents who have much more information than rest of the respondents for gathering certain historical data or information. Local authorities and non-governmental organizations have been considered as the major key informants for this research work.

3.5.3 Observation

Relevant information required for study has been gathered by direct observation without asking the respondents. To assess the socio-economic and cultural situation of the project area a friendly relationship was established to those households where household survey was conducted. Observations were made in the morning (7:00 AM to 9:00 AM), afternoon (1:00 PM to 3:00PM) and evening (5:00 PM to 7:00 PM) on the different activities of the household concerning the social, economic and cultural aspect.

3.6 Data Analysis and Interpretation

Data analysis is the process of looking at and summarizing data with the intent to extract useful information and develop conclusions. The data obtained through the various methods discussed has been processed and analysed in descriptive as well as statistical way. The collected data would be either quantitative or qualitative in nature. The statistical analysis has been very simple by using statistical tools such as table, mean, percentage, frequency etc.

For the analysis, a general list of population and number of household data was prepared. Then the available qualitative and quantitative data of the sample area were presented in charts and tables. Finally, data collected by various means as discussed earlier were categorized in different topics on the basis of analysis and again tabulated.

3.7 Limitation of Study

This study has been aimed to fulfill the partial requirement of Masters Degree in Sociology. This research has been conducted on the project affected areas of Khudi Hydropower Project (KHP) which is relatively a confined area of influence. Since every hydropower projects are site, context and engineering design specific the findings and conclusion resulted thereof may not be generalized to district and national level, nevertheless the outcomes of this research work can be used as milestone to assess the impacts of small hydropower project to the people.

Summarizing, this study is based on the following:

- The study is principally based on field survey.
- The study is mainly focused on the impact assessment with respect to socio-economic and cultural aspect of the project sample VDCs of the Khudi Hydropower Project (KHP).

- The study considers solely the impacts generated by the KHP but not by any other development activities conducted within the project impact area and its vicinity.
- Since the study is for academic purpose and not intended for formulation of laws and regulations, it has a confined area of field study.
- Due to the financial and time constraints, limited resources have been used in this study.

CHAPTER-4

Survey, Data Analysis and Major Findings

4.1 Introduction

This chapter attempts to analyze the information received from structured as well as unstructured questionnaires, observation and informal discussions. Analysis will be basically focused on the examinations of the basic parameters, which are directly or indirectly related to the objectives of the study.

The impact area of Khudi Hydropower Project is located within Khudi VDC, Ghanpokhara VDC and Simpani VDC. The project structure like intake, penstock are located on the banks of Khudi River where as the Powerhouse is located in the right bank of Khudi River in the Simpani VDC. The major settlements near the project area are Pallotari and Khudi Bazaar of Khudi VDC and Paikhola of Ghanpokhara VDC. Moreover, the settlements like Tarapu of Khudi VDC, Tallopachok, Tabai and Dhaad of Simpani VDC and Mirje of Ghanapokhara VDC are the other affected settlements of the project area where the sampling has been carried out.

4.2 Socio-Economic Characteristics

4.2.1 Age Sex Composition and Education Structure

Age and sex composition are the basic demographic characteristics which play an important role in the population analysis as these traits directly influence the nationality, mortality and marriage. Similarly, other population parameters such as occupation, education are also influenced by age and sex composition. It also represents the family structure of the VDCs.

Table 4-1 Population Distribution by Age and Sex

Age Group	Male		Female		Total	
	Number	Percent	Number	Percent	Number	Percent
0-5	58	13	36	11	94	12
6-15	86	19	54	16	140	18
16-30	98	22	92	28	190	24
31-45	63	14	67	21	130	17
46-60	67	15	50	15	117	15
60 above	79	18	30	9	109	14
Total	451	100	329	100	780	100

Source: Field Survey, 2008

Table 4-1 shows that the population of the male is greater than the female in the sample HHs. The economically active human resource is considered to be the age range between 15 to 60 years. Therefore, the percentage of working population of total sample population is 56 % which is comprised of 29 % of male and 27 % of female. The dependent population in the sample HHs is 44 %. Analysis shows that the male population is greater by 2 % than the female in the sense of total economically active population. Figure 4-1 shows the population distribution of the sample HHs in bar chart.

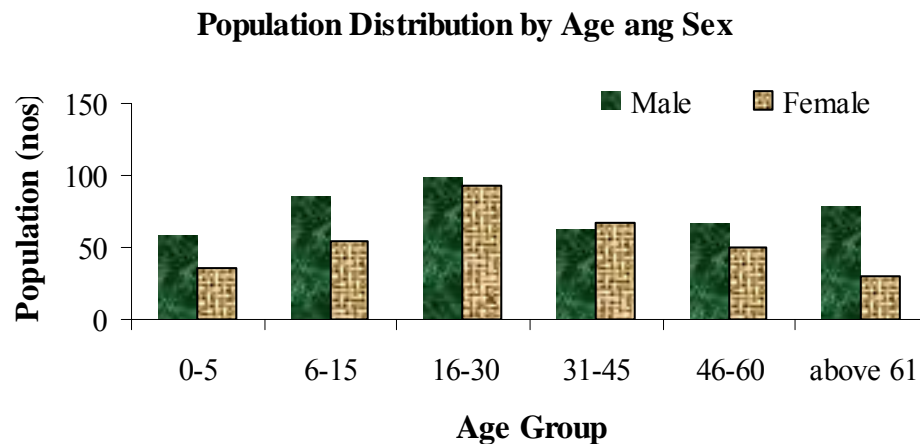


Figure 4-1 Population distribution by Age and Sex

Survey has shown that the people below 15 years and above 60 years fall under economically inactive and are not usually seen under any productive works in the job market. Among the dependent population 30 % are children and 14 % old which are dependent on economically active population. The 14 % of old population denotes the relatively short life expectancy in the study area. The age group of 0-15 and above 60 years are not seem to be involved in any income generating activities, however, due to our cultural norms and values they can be expected to be involved in various types of household jobs such as rearing of cattle, looking after children, bring water, cleaning houses, cooking food and collecting fire wood.

Education is the key indicator of the human development. Education provides people with tools and knowledge they need to understand and participate in today's world. It helps to sustain the human values that contribute to individual and collective well-being. It is the basis for lifelong learning. Education also improves one's quality of life. It enhances the ability of households to manage health problems, improve nutrition and childcare, and plan for the future. Basic education provides

girls and women with a greater understanding of basic health, nutrition and family planning, as well as of their own potential. Educated women marry later, have fewer children and receive better prenatal care. It is also vital for economic development. Education is essential for economic development and eradicating poverty. It allows people to be more productive, to play a greater role in economic life, and to earn a better living.

Table 4-2 Education Status by Sex

Sn.	Level of Education	Male	Male, %	Female	Female, %	Total	Total Percentage (%)
A	Illiterate	97	25	105	36	202	29
B	Literate						
B.1	Primary (1-5)	226	58	141	48	367	53
B.2	Secondary (6-9)	42	11	32	11	74	11
B.3	10 Class or above	28	7	15	5	43	7
	Total (A+B)	393	100	293	100	686	100

Source: Field Survey, 2008

Table 4-2 shows that the 29 % of the overall sample population in the HHs are illiterate, among which the male illiterate weighted to be of 25 % and female to be of 36 % of their category. The overall literate sample population is 71 %, where the male literate comprised of 75 % and female 64 % of their category. It is observed that the literacy rate in the study area is above to that of the district average rate i.e. 54 % (CBS, 2061).

Out of the total literate population 53 % are reading in the primary level, 11 % in the secondary level, where as 7 % have completed school level education and even more.

During the survey, standard norms of literate counting have been used. The sample population having ability of reading and writing simple sentences either in their mother language or in the national language along with the ability of performing simple mathematical calculation above the age of six has been counted as literate. The sample population above age of six has been taken for the educational data.

The education status of the sample HHs has been shown in Figure 4-2.

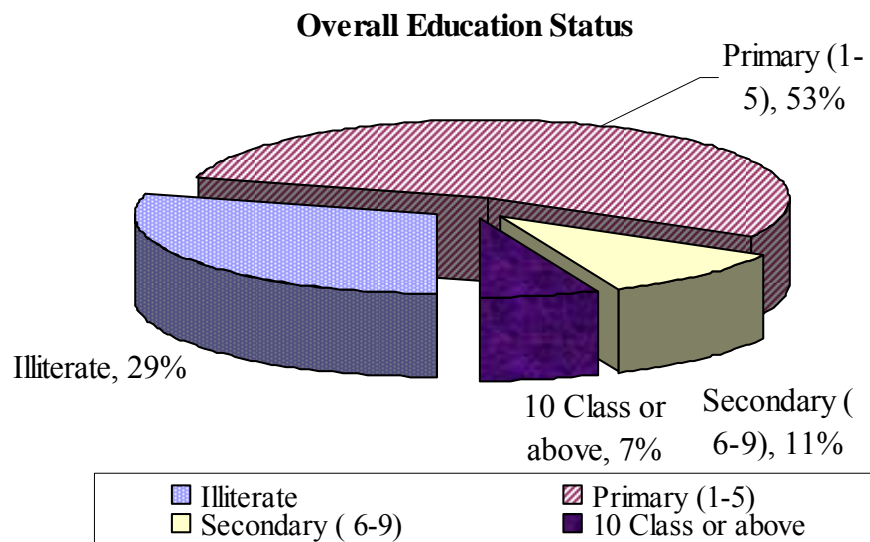


Figure 4-2 Education Status

These statistical data shows that the primary level education is higher in proportion to the secondary level education.

4.2.2 Ethnic/Caste Composition

Ethnicity plays an important role in the social cohesion of the people living together. Caste and ethnicity also influence on the occupation,

social status, norms and values to some extent. It may create social hierarchy and segmental division of society. The study comprises of a wide range of ethnic/caste groups such as *Brahmin*, *Chhetri*, *Gurung*, and the so called occupational caste such as *Damai*, *Kami* and *Sarki*. The ethnic structure of the sample HHs based on sample households is shown in Table 4-3.

Table 4-3 Ethnic/Caste Composition

Caste/Ethnic Group	No. of HHs	Percentage (%)
Brahmin	25	26
Chhetri	24	24
Gurung	34	35
Occupational Caste (<i>Damai</i> , <i>Kami</i> and <i>Sarki</i>)	15	15
Total	98	100

Source: Field Survey, 2008

Table 4-3 shows that the majority of the households are *Gurung* i.e. 35 %. The so called occupational caste like *Damai*, *Kami* and *Sarki* are the least in the sample HHs i.e comprising of 15 %. Among the respondent 26 % are *Brahmin* and 24 % are *Chhetri*. Ethnic/caste distribution of the respondents in the study area is shown in the pie chart Figure 4-3.

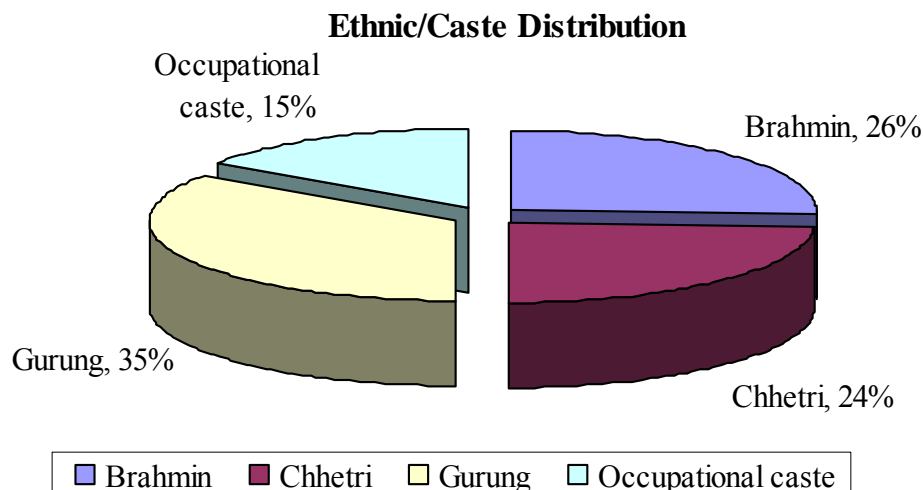


Figure 4-3 Ethnic/Caste Distribution

4.2.3 Occupational Status of the Respondents

Agriculture is seen to be the mainstream employment and for the income generating activity. The study area is full of multiple source income families. Most rural households derive incomes from multiple sources. The importance of remittances has played a vital role for most of the families to sustain their economic activities although agriculture is true contribution to the economy.

Table 4-4 Occupational Status of the Respondents

Occupation	Main Occupation of the Respondents	Percentage, %
Agriculture	75	77
Services	12	12
Business	6	6
Labor	5	5
Total Households	98	100

Source: Field Survey, 2008

Agriculture is the main occupation of the project area. About 77 % of the respondents are involved in agriculture for their primary livelihood. Besides agriculture, 12 % are engaged in service, 6 % are engaged in Business and 5 % are in labor works. (Refer Table 4-4).

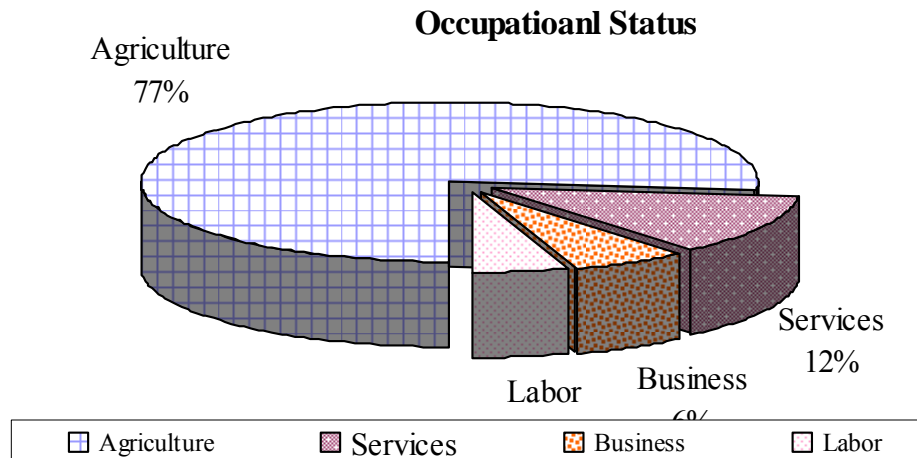


Figure 4-4 Occupational Status of the Respondents

4.2.4 Livestock Situation in the Sample HHs

There is no such scientific and professional practice of animal husbandry and poultry farming in the study area. People engaged in agriculture possess buffalos, cows/oxen, sheep/goats and other such as hen, cocks, ducks etc. Main purpose of this farming is for getting milk, fertilizer and meat. Meat and milk are the main income generating sources of people. Some of the people in the study area were found to have used excreta of these animals for bio-gas. The livestock situation in the study area can be analyzed by the following table and pie chart.

Table 4-5 Livestock Situation in the Sample HHs

Types of Livestock	Nos of HHs	HHs Percentage, %	Total number of Livestock
Buffalos	15	15	190
Cows/oxen	18	18	92
Sheep	5	5	75
Fowl	22	22	173
Goats	38	39	294
Total	98	100	824

Source: Field Survey, 2008

Table 4-5 shows that the highest percentage of households (39 %) possessed goats and then 22 % of the sample households possessed fowl. The main purpose of this animal husbandry is for the purpose of meat. Observations during the survey also revealed that most of the households have their fowl and goat sold in the local market like Khudi Bazaar and Besishar. However, some of the goats and fowls are also sold within the village during the festivals and ceremonies. The percentage of households possessing cow/oxen and buffalos are 18 % and 15 % respectively. Oxen were primarily used for the ploughing and cows and buffalos for milk. During the field survey it was also observed that the cow and buffalo dung was used for the bio gas production. Possession of sheep is the least among entire animal in the study area. Only 5 % of the sample households were involved in the sheep husbandry for the purpose of meat. The bar diagram shows the schematic figures of the livestock situation in the study area.

The key informant, like secretary of the village also conferred the purposive fact of animal husbandry in the village for milk and meat. These activities were found to be of prominent importance for the economic status of the study area as it is directly related to the cash transaction.

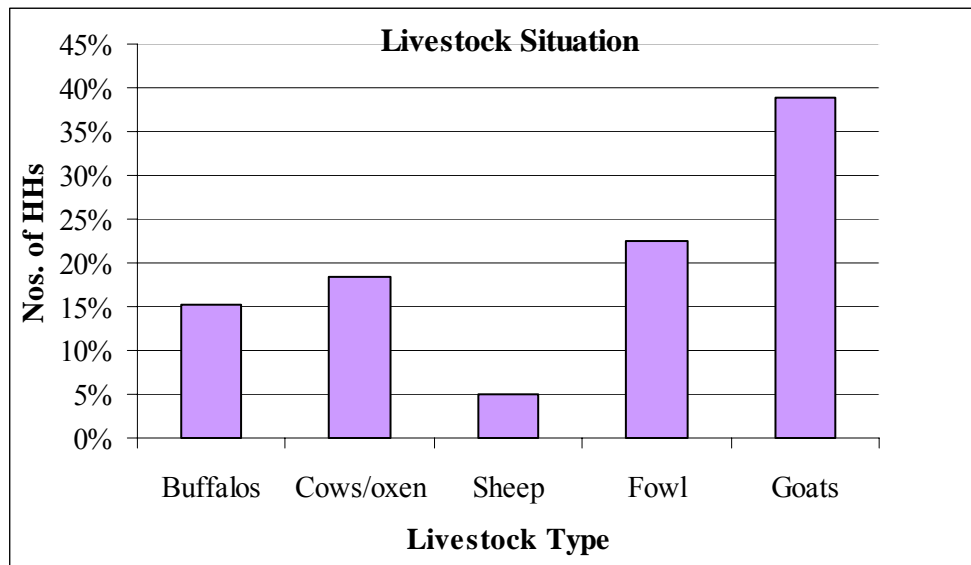


Figure 4-5 Livestock Situation

4.2.5 Land Tenure

The total area of Khudi, Ghanapokhara and Simpani VDCs is about 669 hectares, 594 hectares and 611 hectares respectively (*ICIMOD, 1996*). The general land holding pattern of the people in the VDCs is agricultural land (upland/ *Pakho Bari* and Lowland/ *Khet*), forest- land and thatch – land. This pattern of land holding also applies to the sample population of the study area too.

Table 4-6 Size of Land Holding

Size of Land Holding, (in Ropanis)	Nos. of Households	Percentage, %
Below 5	40	41
5-10	29	29
10-15	17	18
15 above	12	12
Total HHs	98	100

Source: Field Survey, 2008

The land is unequally distributed among the farmers of the study area. Although most of the sample households possess land of their own, a majority of the people have land below 5 Ropanis i.e. 41 %. This is one of the reasons that most of the people are involved in the foreign jobs rather than in agriculture. About 29 % of the sample households hold the land area in between 5-10 Ropanis, whereas it is 18 % for 10-15 Ropanis of land holding. Only 12 % of the sample households hold land above 15 Ropanis. This is shown in the pie chart as in Figure 4-6.

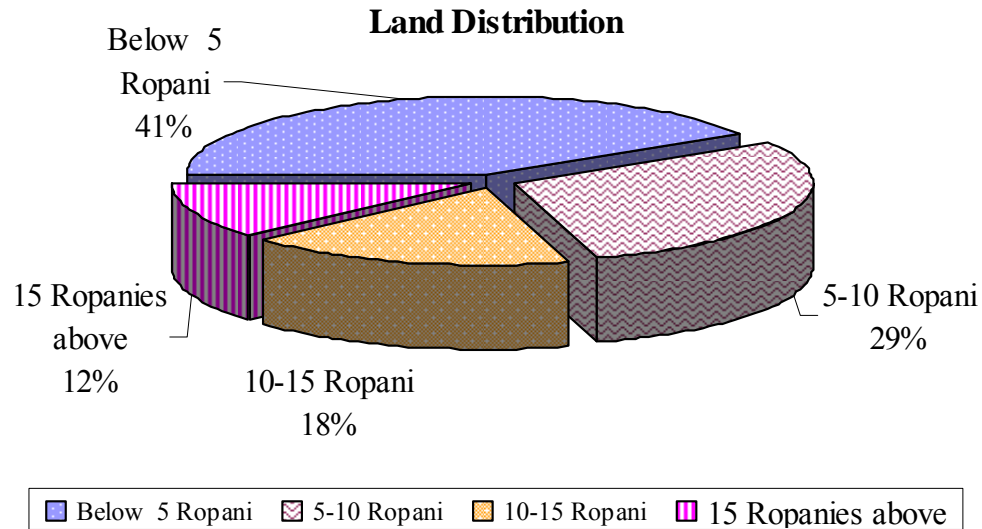


Figure 4-6 Land Distribution Pattern

4.2.6 Annual Income Level

Income level determines the resource mobilization, living standard, education and health. Generally, it is believed that high level of income increases the quality of life. There are many sources of income activities such as agricultural activities, services (government and non governmental jobs), foreign jobs, business and others like laboring. Usually, it is difficult to figure out an individual household’s income as the members of the households are not aware of recording their income regularly. Moreover, the respondent is reluctant to respond such type of questions due to the fear of publicity of their economic status. In general, material wealth has been adopted as the tool to categorize an individual or a family in the hierarchy of society in the study area, which in fact is also a general trend in the country. To estimate the general household income of the family probable sources of income generation such as sale of agricultural, livestock and poultry products, salary, labor and business income has been taken into account. The annual income level of sample population is shown in the Table 4-7.

Table 4-7 Distribution of Respondents by Annual Income

Annual Income Level, (in NRs '000)	Nos. of Respondents	Percentage, %
NRs 40,000- NRs 80,000	12	12
NRs 80,000- NRs 120,000	6	6
NRs120,000-NRs 140,000	12	12
NRs 140,000- NRs 180,000	12	12
NRs 180,000- NRs 220,000	23	23
NRs 220,000- NRs 260,000	21	21
Above NRs 260,000	12	12
Total	98	100

Source: Field Survey, 2008

Table 4-7 shows that most of the household has the annual income level in between NRs 180,000 to NRs 2, 20, 000 which is 23 %. About same percentage (21 %) of people has income level of NRs 220,000 to NRs 260,000. 12 % of the household has an annual income below NRs 80,000 which is slightly more than 1 US Dollar per day. A fewer number of household has the income level above 260 thousand Nepalese Rupees i.e. 12 %.These figures are presented in the pie chart as follows.

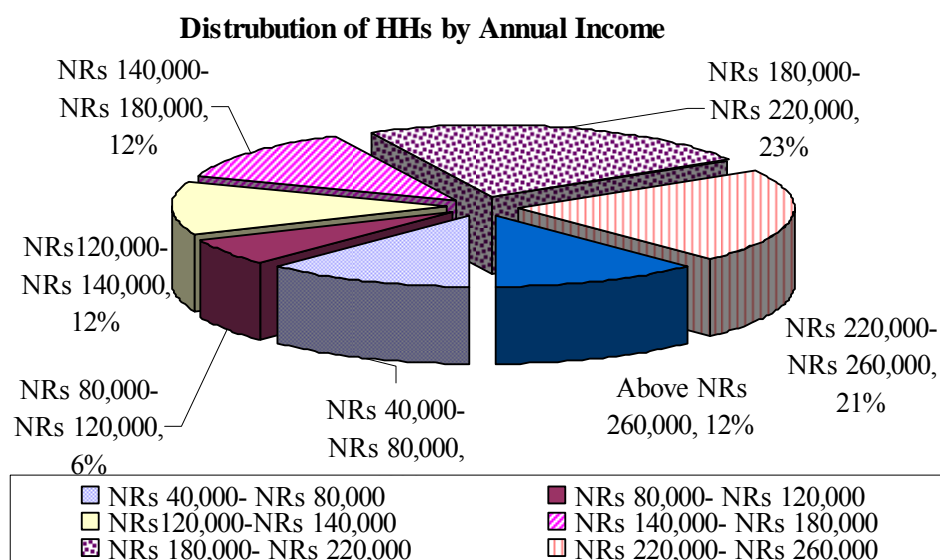


Figure 4-7 Distribution of the Sample Households by Annual Income

4.2.7 Migration Pattern

The out-migration is a regular phenomenon which occurs mostly in an economically active age group. Usually people migrate to Besishar (district headquarter for business purpose), Kathmandu, India, Qatar, Dubai, Malaysia and Saudi Arab especially during off farming season either for employment purpose or for the long term migration.

Table 4-8 Distribution of Sample HHs by Migration Pattern

Migration Destinations	Nos. of People from HHs	Nos. of HHs	Percentage HHs, %
India	35	18	18
Qatar	6	4	4
Malaysia	12	9	9
Dubai	12	8	8
Saudi Arab	18	18	18
Hong Kong	8	8	8
Iraq	6	6	6
With in Country	69	23	23
None	0	4	4
Total	164	98	100

Source: Field Survey, 2008

Of the respondents, 96 % of the sampled household's family members have gone out for seeking jobs. The total sample number of persons migrated from their villages is 164, making an average of 1.7 per sampled households. Among the migrated people of the sample HHs, 23 % of the HHs is within the country, 18 % in Saudi Arab and India and 9 % in Malaysia. Likewise, number of HHs that has migrated people in Iraq,

Hong Kong and Dubai; and Qatar is 6 %, 8 % and 4 % respectively. There is a very minor percentage of sample households who do not have their family members migrated elsewhere i.e. 4 % (Refer Table 4-8). Women migration is nominal. However, they migrate together with their husbands and families. Those who go to India mostly serve as night watchmen in banks, factories and colonies and such people usually return home once a year especially during the festival. Seasonal migration is still common.

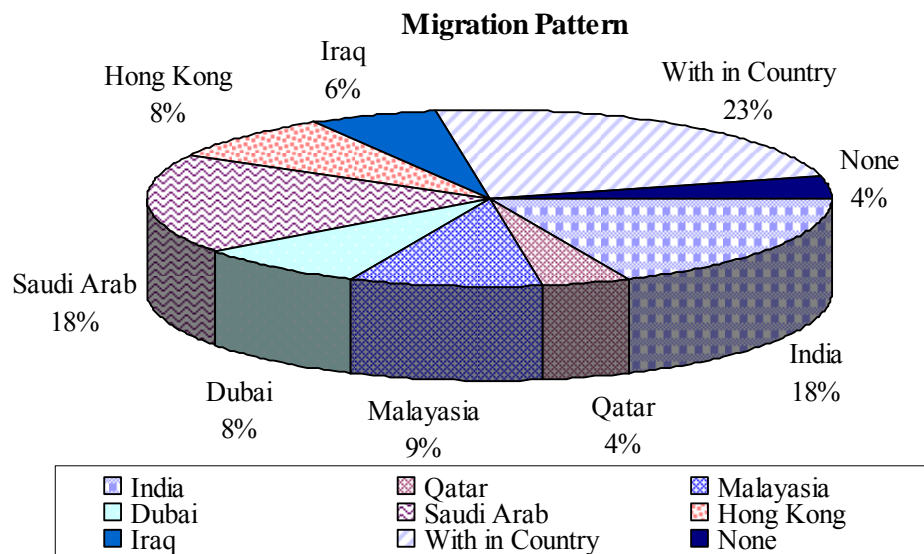


Figure 4-8 Migration Pattern

4.2.8 Expenditure Characteristics

In the project area, agriculture, small business, remittance, livestock and service are the main sources of income. Average annual gross expenditure per household of the sampled HH is calculated to be about Rs. 83,488 of which 50 percent is spent on food, 17 percent on education, 8 percent on medicine and clothes, 14 percent in festival, and about 1 percent on electricity and 2 percent is spend in other item (Refer Table 4-8). Off-farm activities and remittance carry much more meaning to the

people of the study area as income earned through these activities can substantiate the household expenditure.

Table 4-9 Expenditure Characteristics

Expenditure Category	Expenditure Amounts of Sample HHs (NRs)	Average Expenditure per HHs (%)	Percentage (%)
Food	4,116,000	42,000	50
Education	1,357,593	13,853	17
Electricity	44,878	458	1
Medicine	688,849	7,029	8
Cloth	637,000	6,500	8
Festivals	1,158,744	11,824	14
Other	178,744	1,824	2
Total Expenditure	8,181,808	83,488	100

Source: Field Survey, 2008

The pattern of spending in the sample households is presented in the bar diagram (Figure 4-9).

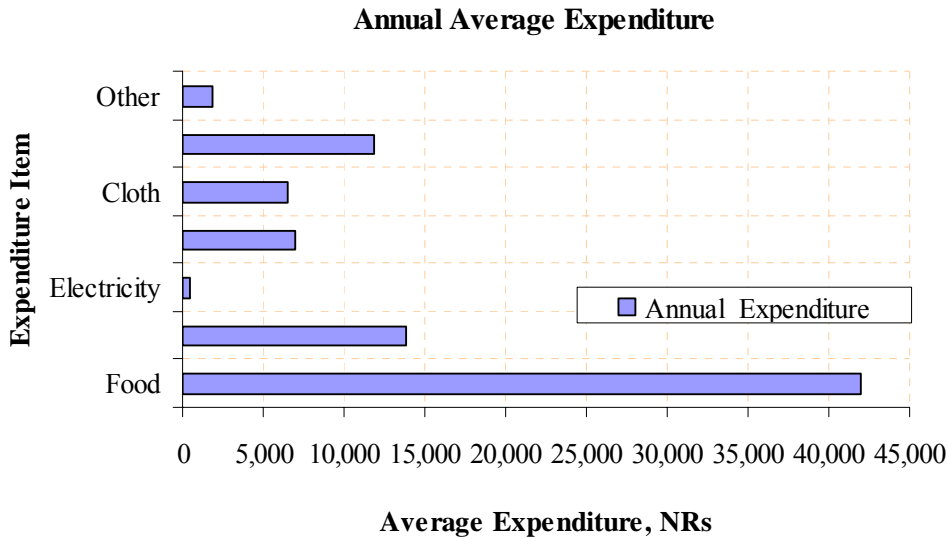


Figure 4 -9 Annual Expenditures

4.3 Energy Use Pattern

4.3.1 Fuel and Fodder

In the study area, wood is the main source of fuel for cooking and heating. Almost 63 % people use firewood for cooking and heating purposes. A very few people use kerosene stove for the cooking purpose. Kerosene is also used for lightning purpose. None of the households were found to have used electricity for cooking purpose in the study area.

Woods are normally collected from forest and their private *Bari*. A very few of the household used *Gobar* Gas and LPG gas for cooking purpose (Refer Table 4-10).

Table 4-10 Energy Use Situation

Energy Type	Nos. of HHs	Percentage, %
LPG (Cylinder)	12	12
Gobar Gas	18	18
Kerosene	6	6
Fuel wood	62	63
Electricity	0	0
Total	98	100

Source: Field Survey, 2008

Most of the households fetch fodder from trees grown in their own farmland and also from community forest. The energy use pattern for cooking is shown in the bar diagram as follows.

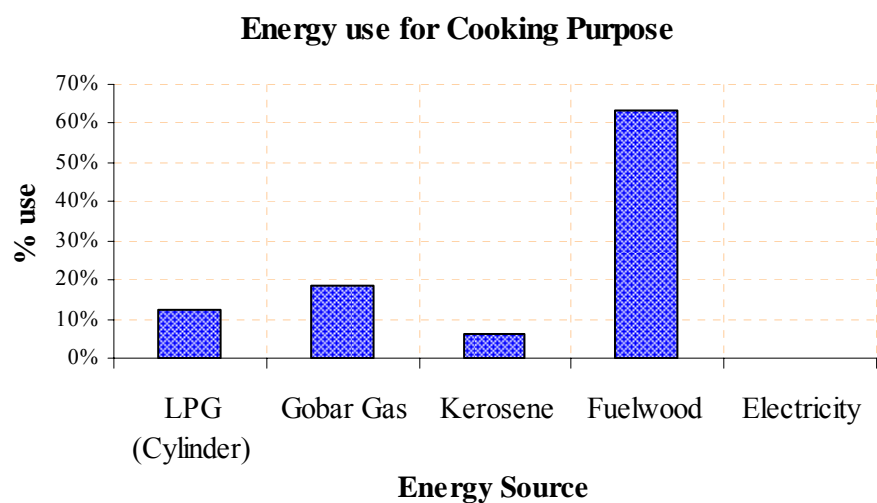


Figure 4-10 Energy Use for Cooking

4.3.2 Main Energy for Lighting Purpose

There is no scientific means used for lighting in the study area. Although some of the sample households used solar power (7 %) for lighting, none

of the sample households were found to have used electricity. Out of 98 number of sample households 93 % of them uses kerosene for lighting before coming of the Khudi Hydropower Project. Despite the use of biomass as lighting in most of the rural communities of Nepal, none of the sample households in the study area were found to have relied on biomass such as *Guithas* (sun dried animal dung) for lighting.

Table below shows the general energy use pattern of lighting in the sample households of the study area.

Table 4-11 Energy Use Pattern of Lighting

Energy Type	Nos. of HHs	Number of people of HHs	People, %
Electricity	0	0	0
Solar Energy	7	55	7
Kerosene	91	725	93
Total	98	780	100

Source: Field Survey, 2008

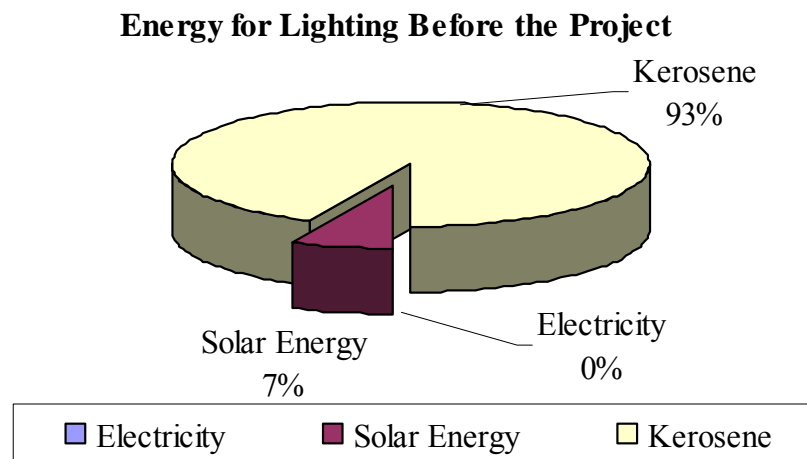


Figure 4-11 Energy Use for lighting

4.4 Socio-Economic Impact of the Project

4.4.1 Time Consumption for the Purchase of Kerosene

Survey found that none of the households used electricity for lighting and cooking purpose. The major source of energy for cooking and lighting are fodder and kerosene. However, some of the sample households were found to have used solar energy for lighting.

Before coming of the Khudi Hydropower Project, most of the households used kerosene and they spent much time to fetch it but after the commissioning of the project, the problem was found to be decreased prominently, which is shown in the Table 4-12 and Table 4-13.

Table 4-12 Time spent for purchase of kerosene before the project

Time Range (in hrs.) per week	Male		Female		Total	
	Nos.	%	Nos.	%	Nos.	%
0-1 Hrs.	28	29	98	36	126	34
1-2 Hrs.	46	47	115	42	161	43
2-3 Hrs.	23	24	63	22	86	23
Total	97	100	276	100	373	100

Source: Field Survey, 2008

Table 4-13 Energy for Lighting Purpose after the Project

Energy Type	Nos. of HHs	Number of people of HHs	People, %
Electricity	75	593	76
Solar Energy	6	57	7
Kerosene	17	130	17
Total	98	780	100

Source: Field Survey, 2008

Table 4-12 shows that 43 % of the total sample population spent more than 2 hours for the purchase of kerosene for lighting and cooking; where, about 47 % of male and 43 % of female are involved for this purpose. However after the project, the scenario has changed dramatically as only 17 % of the sample family member is dependent on kerosene for lighting. This dependency was about 93 % before the project. Thus, the people dependent on kerosene is decreased by 76 %. In an average, the same percentage of sample households have save their time after coming of the project and utilized surplus time for household activities, agricultural works and income generating activities such as off seasonal vegetable farming and commercial poultry farming.

4.4.2 Drinking Water Facilities

The people in the study area were found to have managed drinking water system by themselves before the project. About 59 % of the sample households managed drinking water at their own home, i.e. used private tap. However, the locally managed private taps were found to be temporary with the water source at nearby Khola. Before the project, 6 % of the family depended on *Kuwa*, 35 % on public tap for drinking water.

Table 4-14 Drinking Water Facilities before the Project

Drinking Water Source	Nos. of HHs	Percentage, %	Time Spent (Hrs.)
Kuwa	6	6	1/2
Public Tap	34	35	1/2
Private Tap	58	59	
Total	98	100	

Source: Field Survey, 2008

Table 4-15 Drinking Water Facilities after the Project

Drinking Water Source	Nos. of HHs	Percentage, %	Time Spent (Hrs.)
Kuwa	0	0	
Public Tap	46	47	5 minutes.
Private Tap	52	53	
Total	98	100	

Source: Field Survey, 2008

Better access to clean water, sanitation services and water management creates tremendous opportunity for the poor and is a progressive strategy for economic growth. So, drinking water supply facilities is one of the major constraints that directly influence the socio-economic status of people. Firstly, it influences on health of people. Clean drinking water can reduce the tendency of people being affected from different water borne diseases. This will obviously reduce the people expenditure on medicines and save time of hospital check up. Moreover, due to the use of nearby public taps, women and children save countless hours of walking to more distant water sources. In one hand, this time saving created various income generating opportunities to the local women such as off seasonal vegetable farming and commercial poultry farming; and on the other children have got enough time for reading and writing due to the nearby school with support from Khudi Project. From table presented earlier, a remarkable number of sample households have reduced their time of walking for more distant water source by half an hour. This is one of the positive socio-economic impacts of the project in the study area.

4.4.3 Sanitation (use of toilet)

The poor gain directly from improved sanitation services through improved health, averted health care costs and time saved. Good management of water resources and sanitation brings more certainty and efficiency in productivity across economic sectors and contributes to the health of the ecosystem. Taken together; these interventions lead to immediate and long-term economic, social and environmental benefits that make a difference to lives of billions of people.

Table 4-16 Sanitation Facilities before the Project

Facility Type	Nos. of HHs	Percentage, %
Toilet Possession	46	47
No Toilet facility	52	53
Total	98	100

Source: Field Survey, 2008

Table 4-16 shows that majority of the sample households (53 %) were lacking toilet facilities at their home. Only 47 % of them were enjoying toilet facilities. There are lot of health risks associated with the open toilet practice and unmanaged sanitary waste disposal in the villages.

Rising fertilizer price is one of the constraints that are degrading the economic status of the agro-based people in the rural area. A properly managed wastewater, excreta and greywater for agriculture and aquaculture can boost up the economic status of the people.

Table 4-17 Sanitation Facilities after the Project

Facility Type	Nos. of HHs	Percentage, %
Toilet Possession	98	100
No Toilet facility	0	0
Total	98	100

Source: Field Survey, 2008

Table 4-17 is the picture of sample households that are benefited from the toilet facilities in the project area after the project implementation. All of the sample households were found to have benefited from toilet facility. The percentage of households not having toilet before the project has declined to zero by the support from the project. During the survey some of the households were found to have used their toilet effluent for the purpose of bio-gas. This has saved their expenditures on the cooking and lighting, thereby increasing the family savings.

4.4.4 Health Facilities

Socio-economic impacts can be health related or others. Health related socio-economic impacts of the project can be due to various means. Firstly, due to reduction in public and private costs of diseases prevention and treatment such as drugs diagnostic tests and time of health workers i.e. the reduction in the direct cost of the people. Secondly, gain in production from averted illness and death i.e. reduction in indirect cost. Table 4-18 shows the time spent by the sample households for the health facilities in the project area before and after the project.

Table 4-18 Time Spent for Health Facility before the Project

Time (Hrs)	Nos. of HHs.	Percentage, %
<1/2 Hrs.	64	65
1/2 - 1 Hrs.	28	29
1- 2 Hrs.	6	6
Total	98	100

Source: Field Survey, 2008

Table 4-18 shows that about 65 % of the households used to spend about half an hour to seek the health post facilities. 29 % of them spent up to one hour for the same facility, while, 6 % of them spent up to two hours before the project implementation.

After coming of Khudi Project people have saved their time spent for health check up dramatically by health posts run under the health support program of the Khudi Hydropower Project.

Table 4-19 Time Spent for Health Facility after the Project

Time (Hrs)	Nos. of HHs.	Percentage, %
<1/2 Hrs.	98	100
1/2 - 1 Hrs.	0	0
1- 2 Hrs.	0	0
Total	98	100

Source: Field Survey, 2008

The Table 4-19 shows that all of the people of the sample households spent less than half an hour for the health check up. It can be concluded that about 35 % of the sample household people saved on an average of

one hour in the diseases treatment. It was observed that the people used their surplus time saved from such advantage in different productive activities such as off seasonal farming, paltry farming in commercial scale. More specifically, women used this time for reading and writing (*Praud Shiksha*) conducted by Women's Group (*Aama Samuha*) with support from Khudi Project.

4.4.5 Involvement in the Vocational Trainings

Economies are no longer based only on the accumulation of capital and labor forces but on knowledge and information. Vocational training is an important employability factor. Although it does not generate jobs by itself, it greatly helps individuals to compete for available work posts, or to keep whatever employment they have. The trainings on various topics like Improved Farming for women, Stone Masonry Trainings, Bar Bending Training, Leadership Trainings etc conducted by Khudi Project also encouraged the local people to start new income generating activities efficiently. Table 4-20 shows that only 12 % of people of the sample households were involved for some kinds of vocational trainings. However, after the project this has increased to 94 % after the project implementation. During the survey, most of the respondents were found to have engaged in some kinds of income generating activities after the trainings conducted by Khudi Project (Refer Table 4-21).

Table 4-20 Households involved in Vocational Trainings before the Project

Item	Nos. of HHs.	Percentage, %
HHs involved in Vocational Trainings	12	12
HHs not involved in any Vocational Trainings	86	88
Total	98	100

Source: Field Survey, 2008

Table 4-21 Households involved in Vocational Trainings after the Project

Item	Nos. of HHs.	Percentage, %
HHs involved in Vocational Trainings by the Project	92	94
HHs not involved in any Vocational Trainings by the Project	6	6
Total	98	100

Source: Field Survey, 2008

4.4.6 Employment Opportunities

A number of employment opportunities were found to be generated in the study area. An initiation of the opportunities in the study area in association with a local NGO named COPPADES, helped to increase the employment for the sampled households in Khudi, Simpani and Ghanapkhara VDCs by providing valuable skills development, on-the-job work experience and long-term employment opportunities.

Table4-22 Number of People Employed in the Project Construction Activities

Item	Nos. of HHs.	Percentage, %
HHs involved in the project construction	86	88
HHs not involved in the project construction	12	12
Total	98	100

Source: Field Survey, 2008

Table4-22 shows that about 88 % of the people from the sample households were directly involved in the construction activities of the Khudi Project. Only 12 % of them were not directly involved in the construction activities. However, most of them were found to be involved indirectly to some activities due to the project implementation.

4.4.7 Decision Making Pattern

The implementation of the project in the study area made a remarkable changes in the decision making pattern of the people.

During the survey it is found that 47 % of the family used to make decision by male where as it was 6 % by female. Similarly, 47 % of the family made their decision by consensus of the male and female member of the family (refer Table 4-23). This shows that the study area is primarily patriarchy in nature.

Table 4-23 Decision Making Pattern before the Project

Decision Making	Nos. of HHs	Percentage,%
Male Dominated HHs	46	47
Female Dominated HHs	6	6
Consensus of Male and Female	46	47
Total	98	100

Source: Field Survey, 2008

However, the social structure is found to have changed in decision making process in the study area after the project due to various awareness programs conducted during its implementation. The male domination in the family decision making has declined to 6 %. Likewise, the practice of consensus in this process has increased up to 88 % in the sample households (Table 4-24).

Table 4-24 Decision Making Pattern after the Project

Decision Making	Nos. of HHs	Percentage,%
Male Dominated HHs	6	6
Female Dominated HHs	6	6
Consensus of Male and Female	86	88
Total	98	100

Source: Field Survey, 2008

This type of practices has enhanced the concept of inclusion in the study area. After the involvement of female in decision making on the daily household activities the woman could have active participation in different entrepreneurships. This dramatic change was due to the various awareness programs conducted on women by forming various Women's Group (*Aama Samuha*) with support from the project.

4.5 Economic Analysis: Correlation between Income level and electricity use after Khudi Project

In probability theory and statistics, correlation indicates the strength and direction of relationship between two random variables. A correlation analysis with income Level and the electricity use has shown the medium positive correlation at the study area. Table 4-7 shows that most of the sample households have annual income level of NRs 180,000 to 220,000 , which is 23 % of the sample households. Only 12 % of the sample households have this income level of NRs. 40,000 to 80,000. In general, most of the sample households using electricity at the study area have annual income generation not less than 40,000. The correlation between income level of the households and use of electricity is shown in Table 4-25.

The following formula has been used for the purpose of correlation calculation.

$$r_{12} = \frac{n\sum X_1 X_2 - \sum X_1 \sum X_2}{\sqrt{n\sum X_1^2 - (\sum X_1)^2} \sqrt{n\sum X_2^2 - (\sum X_2)^2}}$$

Table 4-25 Correlation calculation of income level and use of electricity

Income Range	Mid Value Amount Rs('000), (X ₁)	Number of HHs, (X ₂)	X ₁ X ₂	X ₁ ²	X ₂ ²
40-80	60	12	720	3600	144
80-120	100	6	600	10000	36
120-140	130	12	1560	16900	144
140-180	160	12	1920	25600	144
180-220	200	23	4600	40000	529
220-260	240	21	5040	57600	441
>260	280	12	3360	78400	144
n = 7	ΣX ₁ = 1170	ΣX ₂ = 98	ΣX ₁ X ₂ = 17800	ΣX ₁ ² = 232100	ΣX ₂ ² = 1582

$$r_{12} = \frac{7 * 17800 - 1170 * 98}{\sqrt{7 * 232100 - 1170^2} \sqrt{7 * 98^2 - 98^2}}$$

i.e. $r_{12} = 0.51$

Thus, the correlation coefficient is 0.51. This shows that the income level of the sample households in the study area and the use of electricity are medium positively correlated. The electricity use pattern is dependent on income level. It concludes that the households using electricity have increased their annual income level. According to this statistical analysis, if there is 100 % increase in electricity use 51 % increase will be on the income level.

Despite the positive impact of electricity in the study area, some of the respondents expressed their dissatisfaction to electricity to some extent due to the changing food habit of the people; especially children were influenced by the advertisements of junk food in Television after the use

of electricity. Moreover, some of the respondents were worried of loss of extra earnings from fishing as about 3 km of the Khudi River remained dry due to the Khudi Hydropower Project. About 70 % of the sample respondents made their disagreement on the cross cultural marriage which came in to practice prominently after the project activities in the sample VDCs.

CHAPTER- 5

Summary, Conclusion and Recommendations

5.1 Summary

This thesis is solely based on the impacts generated in the study area of the sample VDCs like Khudi, Simpani and Ghanapokhara and reflects the overview of impacts and its assessment in the Nepalese context through the case study of Khudi Hydropower Project. The primary data were collected by observation, questionnaires, case study, semi structured interview and key informant's interview of respondents from the sample unit. The secondary data were collected from the different published and unpublished reports and articles available from governmental and non governmental organizations and websites. Data and information from unstructured questionnaires from 98 households out of 481 households of the Khudi, Simpani and Ghanapokhar VDCs were taken for the analysis. Moreover, some information were also acquired from the key persons such as VDC secretary of the respective VDCs, NGO named COPPADES working in the project area and other social workers involved in the VDCs. This study has used the qualitative and quantitative data analysis on the basis of descriptive and comparative research design method.

The caste/ethnic composition of the sample population shows that the majority of the people in the sample VDCs are *Gurung* (35 %), *Chhetri* (24 %) and Brahman (26 %). There is also a remarkable percentage (15 %) of the so called occupational casts like *Damai*, *Kami* and *Sark*. This shows that the sample people are almost in same proportion in the study area regardless of the cast/ethnicity. However, *Gurung* communities are the most dominant ethnicity that is affected by the project. Similarly,

most of the male population is at the age group less than 15 years. The female population range of 16 to 30 years comprises most in the sample.

The education statistics shows that the overall literacy percentage is 71 % in the study area, where 75 % of the male and 64 % of the female are able to read and write.

Regarding the occupational characteristics of the people, this study shows that the majority of the sample people are dependent on agriculture. However, most of the people (41 %) have land tenure below 5 Ropanies. About 77 % of the people were engaged in agricultural works, although different occupations like service, business and labor were also adopted in the study area. Goats, buffalos, fowl and cow are the predominant livestock owned in the area. Regardless of this economically marginal agricultural status, a majority of people (23 %) have annual income level of NRs 180,000 to NRs 220,000. Likewise, 21 % of the people generated an annual income of NRs 220,000 to NRs 260,000. This controversy in income level may be due to the extra earning of the family from the foreign employment. Indeed, the major occupation of the families is found to be foreign employment although they were reluctant to express it as major occupation. Out of 164 migrants, 18 % of the sample household members were employed in India and Saudi Arab. Another major population (23 %) was found to be migrated within the country. Likewise, there are also people seeking jobs in Hong Kong, Iraq, Malaysia and Qatar from the study area. The expenditure pattern of the people in the study area shows that 50 % of the income is spent on food. About 17 % of the total expenditure is on the education whereas it is only 8 % in medicine and clothes. However, a remarkable amount is spent on festivals i.e. 14 % of the annual expenditure. This shows that the people are highly conscious on their cultural values and norms.

The study shows that the energy use pattern like energy for lighting and cooking is a mix of conventional and modern system. Most of the people (65 %) in the area used fuel wood for cooking. However, about 18 % of them used *Gobar* gas for this purpose. Similarly, 12 % of them used LPG (cylinder) for cooking. Only 6 % depended on kerosene for this purpose. For the lighting purpose, most of the people (93 %) used kerosene before the Khudi Project. Only 7 % of them were found to have installed solar system. However, none of the households were benefited from electricity in the area before the project. Due to this, about 43 % of the people spent about 2 hours to buy kerosene in a week. Another 23 % of the people spent more than 2 hours for the same purpose. This shows that most of the people spent their productive time to fetch kerosene before the project. However, after the Khudi Project 76 % of the sample households used electricity for lighting.

The study revealed the various positive socio-economic impacts due to Khudi Hydropower Project on the sample population. The project not only changed the energy use pattern of the sample VDCs but also improved the quality of life by providing access to the health facility, drinking water and education.

Majority of the selected sample population reduced their time for buying kerosene, walking for more distant water sources and medical checkup. This saved time was used for different income generating activities like agricultural works. There was also a positive impact on the status of health and sanitation. About 53 % of the people without toilet switched to 100 % possession of this facility due to the support provided by the project. More than 35 % of the sample population saved on an average of one hour in disease treatment after the establishment of health post near their village. All these facilities saved time and cost of disease treatment

and increased the productivity of people by averting illness and death of people.

Another positive impact on socio-economic status of the sample people was due to the vocational trainings provided in the study area. About 94 % of the people were benefited by such programs. The study showed the improved quality of life by increasing the competency and access to the competitive job market to start new income generating activities effectively. The employment opportunity increased during the project construction. Different on the job trainings conducted in the study area increased the income of the sample HHs. Awareness programs conducted especially for women enhanced the decision making pattern in the family. About 88 % of the sample population involved in the project activities directly or indirectly.

Despite such positive socio-economic impacts, there are some negative impacts generated by the Khudi Project. Although, none of the family in the project area depended completely on fishing, the extra income from fishing activities was reduced due to the dry River zone of about 3 Km. This reduced the total annual income of families in the area.

About 13 % of the sample population felt disturbance and insecurity in their social activities during the project construction activities. Most of the sample people in this category felt interference on their religious activities by the people engaged in the project construction. About 0.3 % of the sample population got married to the people outside the village engaged in the project where 70 % of the sample under consideration made their disagreement on such cross cultural marriage.

This study also revealed the fact of change in food habit in the local people after the project. Most of the young people were attracted towards

junk food like noodles and cold drinks. People were less attracted towards the traditional food which reduced the productivity of organic food in the study area. Regardless of the positive impacts of electrification in the project area, about 23 % of the sample household raised their annual expenditure for entertainments after project implementation. The younger people spent their money on fashionable clothes and spent more time on watching television. All these activities degraded the socio-economic status of the people due to project implementation.

5.2 Conclusion

The energy consumption pattern is one of the indicators of social development of a country. The construction of hydroelectric projects contributes not only to the economy of a region, but also its environmental and social development. The establishment of such projects also promotes local people's access to roads, schools, health centers, jobs and trade opportunities. In the long run, the project will help improve their living standards. Moreover, due to fast-rising prices of petroleum products, the hydropower is becoming even more relevant to our lives. There are other benefits relating to human resource development like transfer of technology and enhancement on decision making of the rural people. However, there are still some negative impacts generated by such projects in the project affected areas. These impacts on social, cultural and environment should never be neglected.

This thesis reflects the socio-economic and cultural structure of Khudi, Simpani and Ghanapokhara VDCs before the implementation of the Khudi Hydropower Project and assessed the socio-economic and cultural impacts on the affected sample population. A remarkable change on the social, cultural and economic status was found due to Khudi Hydropower Project.

- Khudi Hydropower Project helped for the rural electrification, environmental management and poverty alleviation to some extent in the sample VDCs.
- Working pattern in the society changed due to the use of electricity and less time for distant drinking water source. People increased their annual income by adopting income generating activities on leisure time saved due to easy access of fuel and energy for cooking and lighting.
- People in the study areas improved their quality of life due to the availability of nearby health centers.
- The awareness programs and vocational trainings enhanced the decision making phenomenon in the family and ultimately improved social status of the sampled people, especially female.
- Agricultural productivity and income in the study area increased due to more productive working hours and jobs generated by the project.
- Cross cultural marriage introduced in the study area thereby changing the socio-cultural structure.
- Extra earning by fishing of some households degraded due to the downstream dry zone in the Khudi River.
- A remarkable change in the food habit (prioritizing junk foods) reduced the indigenous/organic food production.

5.2 Recommendations

This study was carried out to assess the impacts of hydropower projects on the affected people with respect to social, cultural and economic

conditions. The impacts of hydropower projects are both positive and negative in nature in society. So, appropriate measures should be taken to mitigate the probable negative impacts to the affected people. Insufficient mitigation measures will create conflict between the projects and people. Moreover, degradation in social and cultural structures and values is likely to occur.

The analysis of the field data and information of the affected sample people in this study has made some recommendations for the resolution of such problems as:

5.2.1 Law

- The prevailing laws and regulations should be thoroughly revised and there should be special laws to be formulated by the government especially for the hydropower projects on the basis of type and size of projects.
- The participatory approach of project development should be made mandatory as a legislative obligation by the government.

5.2.2 Pre and Post Project Impact Assessment

- Benefits and commitments should be made clear during the Public Hearing/Public Outreach Programs. Mitigation requirements spelled out in the various environmental and social documents should be maintained. Early commitments and promises made by project proponents should be fulfilled to the affected communities.
- A local monitoring body should be formed in an inclusive way to assess and mitigate the negative impacts induced by the projects till its operational period.

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APPENDIX A

Household Survey Questionnaires for Socio-economic and Cultural Impact Assessment of Khudi Hydropower Project

**Household Survey Questionnaires for Socio-economic and Cultural
Impact Assessment of Khudi Hydropower Project**

Sn No **Date of interview**.....

(a) VDC..... (b) Ward No..... (c) Location.....

(d) Total number of HHs of this village:

(e) Name of respondent.....

(f) Caste/ Ethnicity (g) Gender

(h) Age (i) Marital Status

(j) Occupation (k) Education

(l) Religion

(1) Please give details about your age, sex and education of your family

Age	Total		Sex					
				Male			Female	
	Male	Fem ale	Educat ed	Uneduc ated	clas s	Educ ated	Unedu cated	clas s
0- 5 Years								
6- 15 Years								
16- 30								

Years								
31-45 Years								
46-60 Years								
Above 61								
Total								

(2) For how many years have you been living in this village?

Local resident () More than years () Others ()

(3) If migrant, what is the reason of migration?

.....

(4) In your opinion, what are the priorities for the development of this area? Please make a priority in numbers.

Drinking Water () Health Post () School () Irrigation ()
Electricity ()

(5) Is any of your family members have gone outside for employment?

If Yes,

Where How many For what time

Annual Income.....

(6) Where do you go for diseases treatment?

Before the Khudi Project:

Distance..... Time

After the Khudi Project:

Distance..... Time

(7) Where do you go for drinking water?

Before the Khudi Project:

Kuwa () Stream () Public tap () Private Tap () Others ()

Distance..... Time.....

After the Khudi Project:

Kuwa () Stream () Public tap () Private Tap () Others ()

Distance..... Time.....

(8) Do you have toilet facility at your home?

Before the Khudi Project: Yes () No ()

If yes, who built the toilet?

.....

If no, where do you go for toilet?

.....

After the Khudi Project: Yes () No ()

If yes, who built the toilet?

.....

If no, where do you go for toilet?

.....

Economic Aspect:

(9) What is the main occupation of your family?

Occupation	Number of persons involved
Agriculture	
Business	
Student	
Fishery	
Service	
Labor	
Please mention if other	

(10) What are your family's annual expenditures in the following headings?

Expenditure headings	Annual Expenditure (NRs)
Food	
Education	
Electricity	
Medicine	
Clothing	

Festivals and Ceremonies	
Others.....	
Total	

(11) What are your family's annual income sources?

Income Sources	Annual Amount (Nrs)
Agriculture	
Business (.....)	
Services	
Industry (.....)	
Labor	
Others	
Total	

(12) How do you manage your expenditures if it exceeds the income?

Before the Khudi Project.....

.....
.....

After the Khudi Project.....

.....
.....
.....

(13) What is the land holding of your family?

Land	Area (Ropanies)	Annual Production
Khet		
Bari		
Khar Bari		
Other		

(14) For how many months does your family sustain from your agricultural production?

- (a) Less than 4 months (b) More than 4 months (c) For 4-8 months (d) For 8-12 months Saving.....

(15) What are your annual transactions of the agricultural products?

Production	Production Amount (Muri)	Buying amount	Selling amount
Rice			
Maize			
Wheat			
Potatoes			
Barley			
Others			

(16) How do you manage for food if your own production is not sufficient?

.....

(17) Please give some details of the animal husbandry at your family.

(a) Cow/oxen () (b) Buffalos () (c) Goat () (d) Fowl () (e)
Buffalos ()

(f) Goat () (g) Sheep () (h) Others (.....)

(18) Have any of your family members taken any kind of skill development trainings? Please mention if any.

Before the Khudi

Project.....

After the Khudi

Project.....

Questions related to Electricity

(19) Does your family have electricity facility? If yes, from which company/source?

Before the Khudi Project.....

After the Khudi

Project.....

(20) Does your family have started any kind of business or enterprises after the electricity facility?

Before the Khudi Project.....

After the Khudi Project.....

(21) What are the electrical appliances in your family?

Electrical appliances/ equipments Project.....

(22) What is the source of fuel for cooking and from where do you collect it?

Energy Source	Energy Consumption (Before Project)	Energy Consumption (After Project)
LPG		
KeroseneLitersLiters
FodderKgKg
OthersKgKg

(23) Where do you fetch fodder if you use it for cooking?

Before the Khudi Project

- (a) Your own Land () (b) National Forest () (c) Community Forest () (d) Other source ()

Distance Time

After the Khudi Project

- (a) Your own Land () (b) National Forest () (c) Community Forest () (d) Other source ()

Distance

Time

About Social Inclusion

(24) Who is responsible for the decision making in your family?

Before the Khudi Project.....

After the Khudi Project.....

(25) What is the impact of the Khudi Project at your area?

.....
.....
.....

(26) Do you have sense of caste/cultural hierarchy at your area?

.....

(27) Please give some information on Division of labor at your family.

Work Type	Before Project		After Project	
	Female (Nos.)	Male (Nos.)	Female (Nos.)	Male (Nos.)
Plough				
Manure transport				
Crop field preparation				
Irrigation works				

Food Processing				
Shepard				
Cooking				
Collecting Drinking water				
Look after children and old age people				

(28) Please give some information on property right and possession in your family.

Property	Share percentage	
	Male	Female
House		
Land		
Cattle		
Ornaments		
Factory and enterprises		
Others		

(29) Did any of your family members involve in the Support works provided by the Khudi project during the construction period?

.....
(30) Was there any conflict during the project construction? If yes, who settled the problems?

(a) Affected People () (b) Project People () (c) Both the public and project People ()

(31) Were there any cases of cross cultural marriage of the local people with outside people involved in the project?

(a) Yes () (a) No ()

If yes, do you agree on such marriage?

(a) Agree () (b) Do not Agree ()

(32) Do you feel insecure of the encroachment on your rituals and culture by the people of the project?

(a) Yes () (b) No ()

(33) Do you think that your family has a changed food habit after the implementation of the project?

(a) Yes () (b) No ()

Thank you for your kind cooperation!