CHAPTER ONE:

INTRODUCTION

1.1 BACKGROUND

There are huge potentialities of producing energy in Nepal. Availability of enormous water resources and topographic situation give rise to a potential for 83,000 mw of hydropower of which about 43,000 mw of power production seems to be economically and technically feasible. Till now, where only about 563 mw has been harnessed which is mainly consumed in urban areas, the rural and remote areas of the nation have no access to reliable energy. In the other hand, in spite of enough possibility of producing energy in rural areas in the form of biogas, solar energy, wind energy, improved water mill, micro and mini hydropower, it has not been used as per the needs.

Peltric-set is also one of the renewable energy technologies which is used in generating electric power from a small quantity of water dropped from a large height. The device consists of an induction generator that runs with a peltron turbine. A high velocity water jet strikes the bucket to run the impeller, which in turn rotates the shaft of the induction generator. The basic principle used is that 'an induction motor tends to generate electricity after it runs faster than the synchronous speed'. An induction generator controller (ICG) is used with a ballast heater for regular power supply and to protect hot water. The device is simple to operate and requires little maintenance. The generated electric power can be used to provide electricity in rural and mountainous areas and is highly suited for use in the Hindu Kush

Himalayan (HKH) region which is full of small streams and rivulets with small discharge flows on sloping land that provides height for the water to drop down. (ICIMOD, 2008).

Appropriateness of any technology also highlights its socio cultural acceptance by the local people. Thus it is necessary for the study of socio-economic feasibility of any transferred technology to the rural people.

1.2 STATEMENT OF THE PROBLEM

Nepal is a mountainous country. 83% of total area consists of mountains and hills. Hence inaccessibility and dispersed settlement is the greatest hindrances in the delivery of essential services and development as a whole. The highly challenging topography and problematic hydro geological condition has rendered the extension of road network really capital intensive, daunting and environmental hazardous (Singh, 2010).This has become a great challenge for the extension of national grid to rural villages and generation of more large scale hydro electricity.

In the context of Nepal's rural areas, clean and reliable renewable energy technologies like Peltric sets seem to be less expensive and require less time to develop. But still there is need of more research to dig out the socio economic impact of any transferred technology to the rural people.

1.3 OBJECTIVE OF THE STUDY

The general objective of this study is to assess the socio economic impact of Peltric set in rural livelihood

The specific objectives are:

- To assess the social impact of Peltric set
- To assess the economic impact of Peltric set

1.4 SCOPE OF THE STUDY

The knowledge based on technical and other socio economic aspects of Peltric set is not much broad. With this limited knowledge base, it is difficult chart out exclusive strate gies for its development. Hence more is needed to be done in the areas of research and development. Involvement of academia like engineering institution would be important role in preparing of technical need of the rural community. They can play important role in the preparation of technical guidelines and code of practices. Likely, social research is required to find the niche of Peltric set in overall energy sector, explore its potential as the complementary means of national grid electricity, identify existing policy hurdle if any propose more conducive policies and strategies.

Finding of this study will be useful for recommending planning and policy maker to formulate appropriate plans for further constructions of Peltric sets in rural villages.

1.5 LIMITATION OF THE STUDY

The study has mainly focus on primary and secondary data. It has been limited on Dhamikhola settlement at Gotikhel VDC of Lalitpur district. It will collect data from the government related agencies, INGOs, its policy makers and individual basis of the study site.

Since the study is applicable mainly to hilly and mountainous region with the correct land topography i.e. the

water head must be at 30-50m height and the water flow must be 3-10 liter per sec. More over there may be some socio-cultural and economic issues regarding the Peltric set due to local social stratification and culture along with the policy hurdles from the law makers side. So the findings of the study may not be applicable to other society and geographic locations in total.

1.6 ORGANIZATION OF THE STUDY

Chapter 1 begins with the general introduction of rural energy technologies including Peltric sets in Nepal, followed by the problem, objectives of the study, scope and limitation of the study. Chapter 2 deals with the review of the literatures. Chapter 3 deals with the methodology and the approaches applied in the research, and the criteria considered for selecting the study site. This chapter also elaborates on the sites and the methodologies used for data collection in the field and the process followed to retrieve and analyze them and the research process. In chapter 4, study area is described through the use of map, tables, figures includes location and accessibility, education status, population, occupation.

In chapter 5, observations and findings of the study is presented along with analysis to fulfill the research objectives. In chapter 6, major findings are drawn from the data presentation and analysis are presented, with the recommendations for the policy measures at the end.

CHAPTER TWO:
LITERATURE REVIEW

A publication (Singh, 2010) explains that Nepal is a mountainous country and its 83% of total area consists of mountains and hills. Hence inaccessibility is the greatest hindrances in the delivery of essential services and development as a whole. The highly challenging topography and problematic hydro geological condition has rendered the extension of road network really capital intensive, daunting and environmental hazardous. As of now, according to the road statistics, Nepal has a total road network of 18828 km only which brings the road density of about 12.79 km per 100 km^2 lowest in south Asia. This however varies significantly in urban and rural area. About six million people will need to walk at least four hours to get to nearest road head.

Ever since the planned development has begun in the country, transportation sector has topped the country's development priority which is manifested by the proportion of the budget it arrested in each development plans. Still, the hard fact is that some district headquarters are yet to be connected by road network. In this pretext it seems impossible that the road network will reach to each and every settlement of the country in a conceivable future. Similarly, due to sparse nature of settlements and low density, in many instances the huge investments on the road construction failed to justify.

A document (Rural Energy Policy of GoN, 2006) states that there are huge potentialities of producing energy in Nepal. Availability of enormous water resources and topographic situation give rise

to a potential for 83,000 mw of hydropower of which about 43,000 mw of power production seems to be economically and technically feasible. Till now, where only about 563 mw has been harnessed which is mainly consumed in urban areas, the rural and remote areas of the nation have no access to reliable energy. In the other hand, in spite of enough possibility of producing energy in rural areas in the form of biogas, solar energy, wind energy, improved water mill, micro and mini hydropower, it has not been used as per the needs.

In this context, there is ample possibility of improving the living standards of rural population by developing by developing environment friendly energy resources in rural areas by making financially affordable to reduce dependency on traditional and fossil fuel resources.

A news paper article (Kantipur daily, March 29, 2011) reports that Alternative Energy Promotion Center (AEPC) was established in November 2, 1996. Since its establishment, it has been actively involved in the promotion and dissemination of alternative energies and renewable energies in Nepal. The overall objective of AEPC is to popularize and promote the use of renewable energy technologies for raising the living standard of rural people. Supporting development of micro/mini- hydropower is one of the major program areas of AEPC.

AEPC implement Energy Assistance Programme II (ESAP) supported by Government of Denmark and the Government of Norway. Mini-Grid Electrification Component of AEPC/ESAP is focusing on promoting off-grid rural electrification with an option

for grid connection. AEPC also executes Rural Energy Development Programme (REDP) with the support from The world Bank and the United Nations Development Programme (UNDP) which promotes community based micro hydro schemes. Government of Nepal has also given high priority to Mini/Micro hydro power named as Special Mini/Micro Hydro power Development Program-SMHDP and AEPC is also executing agency of SMHDP.

Electricity has been realized as not only the engine growth, but also as the basic need even for rural populace. And with the very realization of this fact and an urge to promote equitable and balanced development, the present government is giving high priority to a time –honored but pragmatic and need –felt Programme to scale up of mini/micro hydro development in very remote districts to expedite the electrification of these areas.

Another news paper article (The Kathmandu Post, 25 March 2011) reports that the Government has declared “energy emergency” in the country for the second time in three years. With the country reeling from as many as 14 hours without power per day, it is only logical for the government to come out with effective measures to combat the situation. The government’s declaration of energy efficiency is a step in that direction. On Wednesday (2011 march 23) , the government unveiled its pan to tackle the energy crisis. It wants to two hours a day in the next two years. Further, the government plans to produce 2500 mw of electricity in the next four years. The challenge, of course, is in the effective implementation of the plan.

If the recent past is any guide, such government programmes often fail to bring out desired results. The Maoist led government had also declared an energy emergency and brought forth a National Energy Crisis Reconciliation Working Plan. But in the absence of effective implementation, the plan didn't go very far. Little concrete progress can be seen on the proposed 10,000 mw in 10 years. With demand hovering around 980mw during peak time, the supply is a dismal 480 mw. Adding to this is electricity leakage of around 26 percent. The projected 10 percent per year growth in demand will only make things worse if the supply remains constant. There have been talks of generating electricity through thermal plants, which may provide some relief in the short term. But the diesel to run the plants makes this too expensive to be long term solution.

The government, therefore, must focus on hydroelectricity in addition to tapping alternative sources of energy. Reservoir systems should be encouraged over the currently dominating run-of the-rivers, as rivers tend to dry up during winter when the demand also increases. With reservoir systems in place, stored water could meet winter demand.. The Khulekhani hydro project is currently the only water project run with the reservoir systems. The government seems to be considering focusing on reservoir systems as hydropower projects in the pipe line West Seti, Budi Gandaki and Nausyalgad which are said to have reservoir. The private sector is also being encouraged to produce electricity and the government has announced it will provide an exemption on income tax for 10 years for projects build during the crisis period. The government has further assured the

adequate security for any hydropower project sites. Harnessing alternative sources of energy seems to be another priority of the government. It has decided to waive custom duties on the import of solar panels as well. The government also has plans to install solar panels at Singh Durbar-the administrative secretaries of the government –to generate electricity. While such lofty plans sound good in the offing, results will only be known after implementation. We know this has been a problem in the past and hope we can see its solution in the future.

(Revised and updated version of article published in VIDHYUT SANDESH, 2007, Volume 6, Year9, Nepal Electricity Authority Employees' Union, NEAEU, Nepal)

Contribution of Small Hydropower in National Development-*Er. B. Bhattarai writes,*

The present Endeavour in small hydropower has led to a number of positive contributions like increased use of indigenous resources in the financial, manpower and material resources. The role of such a development is highly valuable in-order to promote productive sectors of the economy and improve living standards of rural population. Major steps to be taken to expand the small hydropower sector are expansion of grid, promotion of domestic financial and human resources, productive end use of electricity through integrated planning and development etc.The development of rural energy is essential not only for uplifting the living standard of rural people through stimulation of local economy but also for the development of country as a whole. But the key point behind this is that up to which extent most suitable alternative sources of

energies for isolated and dispersed hill communities are identified and exploited. In this regard, all possible energy resources should be identified and exploited.

Another publication (www.google.com/CRT Nepal) explains that in rural Nepal, women spent disproportionately more time and make effort in household energy management Renewable energy options such as biomass energy, solar energy and micro-hydropower are the most feasible solutions for supplying modern energy to cater rural energy needs.

The Rural Energy Policy 2006 and associated policies, e.g. subsidy policy are in place to promote technologies. These policies the renewable rural energy are gradually evolving and have addressed gender concerns to some extent. Practical experiences have shown that women-friendly technologies and dissemination approach yield more benefits to the society.

The Rural Energy Policy (2006) has a blanket or gender neutral approach at goal/objective level. It is less vocal or even silent on following aspects when reviewed from gender perspectives:

- Institutional development
- Local human resource development,
- Monitoring (gender disaggregated data),
- Gender budgeting
- Accessibility/affordability to the technologies,
- Ownership,
- Operation and maintenance of RETs

When compared, the major renewable energy programmes (ESAP, REDP, IWMP,BSP) seem ahead of the Rural Energy Policy 2006 in addressing gender concerns.

Rural energy policies should be improved taking into account the experiences gained from the programmes. The Ministry of Environment is kindly requested for consideration of following points in reviewing the Rural Energy Policy 2006 and other relevant policies from gender perspective:

- Incorporate the concept of gender mainstreaming in policy formulation
- There is a need for gendered goal/objectives in energy policy
- Encourage participation of women with righteous remunerations at all levels of the decision making, particularly, local and national energy planning and policy process
- Ensure that programmes/projects develop and implement monitoring and evaluation procedure with gender perspective
- Develop gender sensitive indicators and generate and manage gender disaggregated data and report accordingly
- Implement gender budgeting practice in energy programmes
- Ensure capacity building opportunities for women for operation and maintenance of technologies
- Encourage women to initiate, own and manage renewable energy based enterprises through

- Awareness and appropriate capacity building activity
- Access to financing and women targeted subsidies
- Concession on government taxes, and
- Simplification of legal procedures

A publication (Nepal R., 2010) explains that Peltric sets is an important alternative energy producing technology. Energy can be generated from falling water through the use of Peltric set through the use of motor dynamo which can be used as mechanical power. Electricity generated in this way can be used for lighting, heating, operating machines. In Nepal projects up to 5kw or benefiting house holds 40 are classified as Peltric set project.

Among various technologies of micro hydro, Peltric set is cheap and easy technology. For this, small pipes like those which can be used for drinking water projects can be used. This technology is locally developed technology.

Electricity is an important source of energy required for a competitive socio-economic development of a country. As far as Nepal is concerned energy generated from hydropower resource is the most prominent and feasible energy resource. However, the financial resources, human resources, the prevailing geo-political situation, and topographical and seismic conditions required for the exploitation are simply not in favor of launching large hydropower projects for the generation and distribution of electricity. As a result, there is hardly any chance of reaching electricity to remote hilly areas in the near future . On the other hand, with high hills, scattered settlements and

more than 6,000 rivers criss-crossing the country, a substantial share of electricity demand at a domestic and community level can be met from the micro-hydropower projects, for which most of the resources are already available in the country and hence can be promoted independently and in a local level. In view of these facts, such projects are being launched in Nepal for last four decades. As a result the total installed capacity of micro-hydropower in Nepal has reached approximately 16 MW.

The current data show that only 32 percent of the micro-hydro potential (including electrification and mechanical power) has been harnessed so far in the 43 years history of micro-hydropower (MHP) installation. Thus there is still a great potential of harnessing this resource for the development of the country.

It has been found that the rural people are highly benefited from the electricity generated through Peltric set projects. These benefits include the rise in literacy rate, increase in social activities and awareness development, declining adverse effects of polluting energy sources on health, sanitation, environment etc. These benefits are, however, of intangible nature. Rural people need tangible benefits. However due to several problems being encountered at present they are still deprived of them. Some of the problems are of techno social nature such as water rights reluctance in payment of energy, conflicts among the consumers as well as consumers and entrepreneurs, low salary to the operators, poor management, low maintenance , poor system

efficiency, frequent power interruption, etc. Because of this majority of Peltric set projects are suffering of economic problems. These problems, however, have not yet been studied thoroughly and hence need immediate attention to make the Peltric set projects sustainable in the long run.

Realizing this fact a study was carried out which first reviewed the problems being faced by the projects and analyzed their economic sustainability by taking one of the representative projects as a sample. The analysis was based on certain assumptions and has taken various economic scenarios into account. A sensitivity analysis of the project was also carried out.

One of the smallest and simplest micro-hydropower devices being widely used for the purpose of generating electricity is a PELTRIC set. The name Peltric (Pelton + Electric) was coined in Nepal for small, self contained; electricity generating units.The technology available for this purpose is called Peltric set technology. It is a small vertical shaft Pelton turbine that has a generator co-axially coupled with it. It generates electric power from a small quantity of water, falling from a high head.

The Peltric systems were started since 1991. It can be used to provide electricity to five to ten houses in rural and remote areas especially in the mountainous regions. The smallest unit available provides 60 Watts. Being a simple and small unit, it is easy to install, operate, and maintain. The transmission and distribution cost of electricity produced is low as the generating set can be located near user's houses. An individual or a small group of interested households can easily afford it.

A Peltric set can be used to generate electricity for lighting households (1kW of electric power can light 10 -12 rural households), charging batteries (electricity can be stored in the battery in the daytime), operating radios, televisions, and VCRs, extracting cream from milk and milk processing, heating water, and cooking in low-watt cookers. It has positive environmental implications as its installation, operation and end uses create no pollution at any point . In Nepal, Peltric system is primarily used for lights, radios and TVs. A study has shown that it can also be used for mechanical purposes such as grinding of maize, wheat, millet etc.

In Peltric set, pelton turbine and generator are attached together. Generally the water head must be at 30-60m and the water flow must be 3-10 liter per sec.

Feasibility

12 months enough water availability region

Water head at enough height

The Peltric set can't be installed only by the subsidy provided by Nepal government. So the particular community should collect enough capital or local businessman for investment.

Problems

Error in project survey, weak data collection related with hydrology, machine installed . improperly and unworkable tools machines used.

Powerhouse, water canal being swept away by flood, erosion.

Weak human capital to operate.

Necessary tools , generator which have become old not replaced.
Re maintenance work not done regularly.
Villagers not paying the electricity tariff regularly.

Another publication (Nepal,2010) explains the following features

Social impact on rural livelihood

- Reduction of migration
- Easy to operate so women can also use it
- Students can read and write at evening time

Economic impact on rural livelihood

- Energy used is used for grain purification
- Battery charging
- House hold lighting
- Micro industry establishment

Environmental impact on rural livelihood

- There is no need to construct high dams to collect water so there is no risk of flood ,people displaced
- We can get pollution free electricity which can replace diesel run mills and kerosene lamps
- Reduce deforestation

A document (Renewable Energy Subsidy Arrangements of GoN, 2066) states that Nepal government provides financial subsidy up to 500 kw capacity hydro power projects and technical assistance to up to 1 mw hydro power projects.

- Up to 5 kw capacity new micro hydro projects, every house holds gets Rs. 12,000.00 but it shouldn't exceed Rs. 97,500.00 per kw generated.
- For the rehabilitation of up to 5 kw capacity micro hydro projects, the project will get 50% of total rehabilitation cost but it shouldn't exceed Rs. 1, 25, 000.00 per kw generated.
- For the community purpose of electricity generation to use in religious places, temples, community radio stations, hospitals the projects up to 5 kw electricity generation gets Rs 97,500.00 per kw

For the delivery of the necessary construction materials, tools, machines the hydropower also gets subsidy. If the particular site is 10 km far on foot from the nearest motor able road, the project gets subsidy of Rs. 500.00 per km but it doesn't exceed Rs 30,000.00 per kw. Karnali districts and its adjoining districts (Humla, Jumla, Kalikot, Dolpa, Mugu, Rukum, Jajarkot, Bajhang, Bajura, Accham, Dailekh, and Darchula) the project gets Rs. 30,000.00 in addition. But that site getting transportation subsidy, subsidy arrangements are managed for per kw 8 houses (maximum). For the rehabilitation of micro hydro plants, 50% of above mentioned subsidy arrangements is made.

Another document (Rural energy policy of GoN,2006)the subsidy rate and disbursement criteria will be revised as required in the geographical conditions, population, and available resources. At the center level, Alternative Energy Promotion Center will carry

out activities related to subsidy disbursement, research and developments, formulation of rural energy policies and program, technical assistance and others as prescribed by law.

A case study (www. google.com/ idea forum, Nepal) explains the economic analysis of the Peltric system ,that was performed for one of the project sites at Khahare Khola as a sample. It is located at Birta Deurali VDC-9, Kavre, and Central Nepal. This site was selected, as it represents an average case for Nepal and it could make all required information available.

The existing tariff of the Peltric system in operation is not sufficient to sustain the project. The tariff quoted by the project installers is Rs. 2 per watt per month, but this tariff is not practically applicable. In practice, the users are paying in an average Rs. 0.50 per watt per month only. This little amount they pay can not sustain the project. The NPV of the project is negative in all cases except the condition when the performance of the system is improved and the tariff is Rs. 2 per watt per month. With subsidy, it will be positive if the efficiency is improved.

Hence, review of literature shows that there ample possibility of improving the living standards of rural population by developing environment-friendly, children and women friendly, less costly energy technologies like Peltric sets in rural areas by making financially affordable to reduce dependency on traditional and fossil fuel resources.

But there is need of more research and development in the sector of Peltric sets like social, cultural and economic impact as

it is transferred technology to the rural villages. In the context of Nepal's rural areas, clean and reliable renewable energy technologies like Peltric sets seem to be less expensive and require less time to develop. But still the knowledge based on technical and other socio economic aspects of gravity good peltric sets is not that broad. With this limited knowledge base, it is difficult chart out exclusive strategies for its development. Hence more is needed to be done in the areas of research and development. Involvement of academia like engineering institution would be important role in preparing of technical need of the rural community. They can play important role in the preparation of technical guidelines and code of practices. Likely, social research is required to find the niche of Peltric sets in overall energy sector, explore its potential as the complementary means of transport, identify existing policy hurdle if any propose more conducive policies and strategies.

CHAPTER THREE:

RESEARCH METHODOLGY

3.1 Selection of study area

The study area Gotikhel V.D.C is selected as it lies in the remote region of Lalitpur district, about 30 km far from the Chapagaon bazaar. The Gotikhel bazaar which is the nearest market of the region is connected with a graveled motorable road (at around 1350m asl).

Due to rugged topography, it may take several years for expanding the electric line from the central grid. But the study area has already been electrified from the local Dhami Khola by using Peltric set technology. The project is called “Dhami Khola Ghatte-Jal bidhyut Project). The project is generating 3 KW of electricity for 24 HHs.

So the study area is selected to find out the socio-economic impact of the project in the region.

3.2 Research design

The research is both descriptive and exploratory in nature. The study consisted of the desk study of available literature on peltric set development in Nepal, discussions with professionals and field visits and discussion. It has mainly focused on the feasibility study. both in terms of technical and socio-economic for the installation .All the relevant data/ information ,hence were collected with the help of Topo maps, GPS, checklist, interviews and observation in the field and were analyzed systematically and scientifically with interpretations . This study

has been more empirical with relevant primary data collection from the study area.

3.3 Universe, sample size and selection procedure

In the research, since Peltric set has been serving 24 rural house holds whole universe is taken for research data collection. Name of the respondents is given in Annex 1.

3.4 Nature and sources of data

This study has been more empirical with the relevant primary data collected from the study area. For the better and in-depth analysis and subsequent interpretations secondary data have been amply too used. To generate primary data household survey (focusing study area), a pre-tested semi structured questionnaire was used for interviewing the selected respondents. Moreover, another semi-structured checklist was prepared for guiding the direct field observations. Collected information was triangulated through field and participant observation and key informants.

Analysis of available secondary data compiled from various sources such as reports/records of DDC Lalitpur and other different published and unpublished documents such as books, journals, articles of different GOs, I/NGOs and institutions through various websites.

3.5 Techniques of data collection

Different techniques such as reconnaissance, interviews, observations etc were administered as to extract the relevant information. These techniques have been described briefly in the following:

3.5.1 Reconnaissance Survey

Reconnaissance survey was done at the initial stage to get an overview of the study area. This survey was conducted to get basic information on the situation of the study and to get introduced to the people during initial visit, which was useful to built rapport with local people. The existing bio-physical condition, location of market, school, and VDC offices and general information about culture and socio-economic condition was considered.

3.5.2 Interviews

As a major technique, sampled respondents were interviewed individually. Even an in depth interview was carried out with a respondents to dig out the social problem regarding the Peltric set in the region.

3.5.3 Observation

It was another technique used the course of study. I visited all the HHs as the project has benefited 24 HHs also visited the nearest market center Gotikhel bazaar. I also visited Alternative Energy Promotion Center office, Khumaltar.

3.6 Tools for data collection.

3.6.1 Field checklist

A checklist was prepared for field observation .The semi structured checklist was used which could widely cross check data collected in the field and seek ample suggestions for making the study much more effective. It includes about the identification of possible settlements going to be served, existing market linkage, existing service delivery infrastructures etc. Its format is included in Annex 1.

3.6.2 Topo maps

A 1:25000 scale Topo sheet (2785 10A) was taken for supporting baseline data. It contains basic elements for planning and development of natural resources and human activities. Latitudes, longitudes or grid lines (co ordinates), contour (elevation), rivers, roads, settlements (town and villages), land uses etc are basic elements contained in this map sheet. These elements are essential for identification of any natural resources and human activities, and their location and associated features.

3.6.3 Interview schedule

An interview schedule was taken for the easy process of primary data collection.

3.6.4 Field note

Field notes are important means of recording the happenings and the observation in the field. Field note was used as an important of my research process to record all the relevant information detected during the field information.

3.7 Data Analysis Procedure

All the completed questionnaires were checked and transformed into a preliminary data sheet. Then after, the data were edited and classified so as to meet the objectives.

3.8 Research process

The research began with bringing thoughts on the problem areas and preparing scientific research proposal. Series of discussion were supervisor encouraged critical thinking on concepts used in this research. Colleagues and other professionals provided inputs during informal discussions. Steps followed from the proposal preparation to write up are presented in chart 1.

chart1: Over all research process:

Step 1: Proposal write up

- Literature review
- Discussion with supervisor
- Proposal writing
- Sharing

Step 2: Field planning

- Questionnaire production
- Sharing with stakeholders
- Pre-test of questionnaire
- Meeting district level stakeholders

Step 3: Data collection

- House hold survey
- Key person interview
- Data compiling

Step 4: Thesis production

CHAPTER FOUR:

DESCRIPTION OF STUDY AREA

4.1 LOCATION AND ACCESSIBILITY

The study has mainly focus on primary data than secondary data. It has been limited on Dhamikhola settlement at Gotikhel VDC of Lalitpur district. The study area Gotikhel V.D.C is selected as it lies in the remote region of Lalitpur district, about 30 km far from the Chapagaon bazaar. The Gotikhel bazaar which is the nearest market of the region is connected with a graveled motorable road (at around 1400m asl).

The Dhamikhola settlement is at 1725m asl. It is connected by a motorable road from Chapagaon bazaar to Gotikhel bazaar.

4.2 TOPOGRAPHY

TOPO –MAP: Survey Department

The topo-map, sheet no.2785 06 D (Nepal 1:250000) here shows the study area comes under 637500E to 638500E and 3043000N to 3044000N (UTM coordinates).More than 70% of the study area is covered with cultivated land and human settlement and remaining 30 % steep and uncultivable land. The settlement is scattered .The study area varies in altitude of 1725 m asl. There is one milk and vegetable collection center at Uttish Ghari.

Recently the Dhamikhola is connected by a motorable graveled road (see annex 4). But it seems to be environmentally hazardous. There is one health post, secondary school (private and government), college, police office, clothes shop, mobile phone shop at Gotikhel bazaar which is at 15 min walking distance from the study area.

The Dhami Khola river crosses the newly constructed road. There is no tunnel on the road. The water is open. So during flood season, villagers have to suffer a lot due to cut off transportation system. Due to rugged topography, the study area has been always in shadowed from the development perspectives.

(Field survey, 2011)

4.3 POPULATION

Age and sex of the members of the households:

Age	Male	Female	Total	Sex ratio
Below 10 yrs	20	17	37	117.64
10-59	32	28	60	114.28
Above 59	22	39	61	56.41
Total	74	84	158	88.09

Source: Field survey, 2011

Table 4.3 shows the age and sex structure of the population. Total 158 populations, out of which 74 are male and 84 are female. The sex ratio for total population is 88.09 male per female.

The sex ratio varies from 117.64 below 10 years 114.28 in 10 to 59 years. On the average about 6 people live in each house hold of the area .The maximum population are found in above 59 years.

4.4 EDUCATIONAL STATUS

Literacy of the study area by sex:

Educational level	Male	Percent	Female	Percent
Literate	52	70	36	43
Illiterate	22	30	48	57
Total	74		84	

Source: Field Survey, 2011

The definition of literacy includes those people who can read and write. The value of education is a means of social mobilization. It builds self confidence in people and enhances their ability and efficiency. It also helps community development activities with collective efforts. Sometimes development cannot be accelerated without quality education.

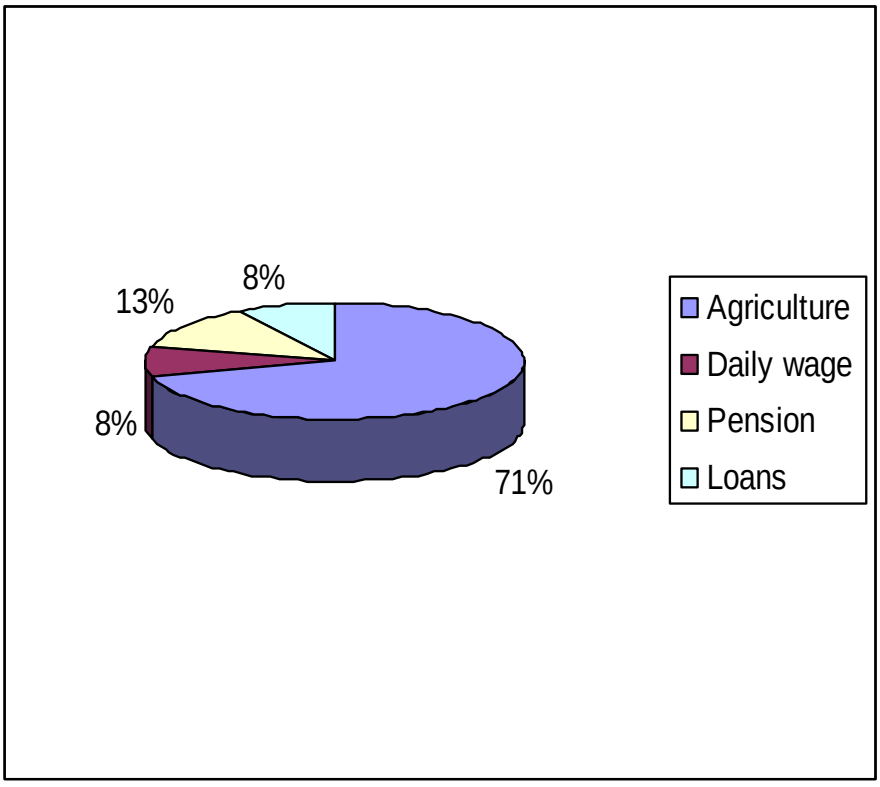
This rate is highly different with male and female. The given table shows that literacy rate in the study areas of male and female are separated.

4.5 MAJOR OCCUPATION

Sources of income in the sampled households

Income sources	No. of households	Percentage
Agriculture	17	71
Daily wage	2	8.25
Pension	3	12.5
Loans	2	8.25
Total	24	100

Source: Field survey, 2011



4.6 LOCAL ENERGY FULFILLMENT

Fuel uses for cooking

Sources	Number of households	Percentage
Forest	5	21
Electricity	0	0
Gobar gas	19	79
Total	24	100

Source: Field Survey, 2011

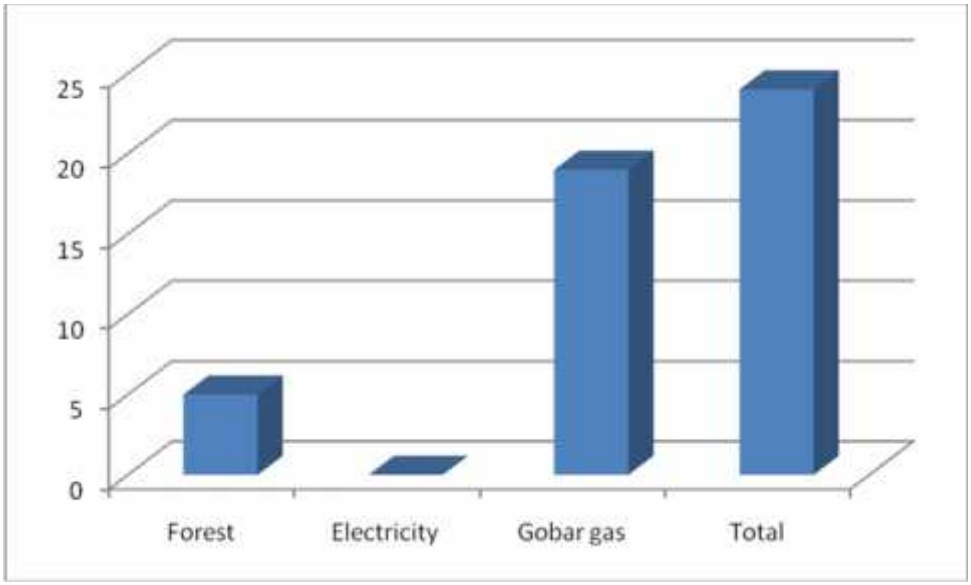


Fig 4.6

Here the chart shows that the energy consumption of the study area indicates that the electricity consumption for cooking is zero wheras 79 percent of the HHs use gobargas fuel for cooking. And 21 percent of the HHs use forest resource as the fuel wood for cooking

4.7 MARKET LINKAGE

Market linkage

Small market	Big market
Bukhel bazaar	Pyangaon
Gotikhel bazaar	Chapagaon
Katan	Satdobato
	Lagankhel
	Kalimati

Source: Field Survey, 2011

For the study area (Dhamikhola settlement) the nearest small market is Gotikhel bazaar and Katan bhanjyang. Whereas the big market is Pyangaon, which is 30 km far from the settlement. The only means of the transport is roadway.

CHAPTER FIVE:

DATA PRESENTATION AND ANALYSIS

5.1 SOCIO-ECONOMIC IMPACT

It is no doubt that the project has revolutionized enough in community's life style. Their quality of life has been increased from the project than before. Before the implementation of the project they were very conservative and poor. They were very poor and low living standard. There were no physical facilities such as electricity, toilet, irrigation, agricultural tools and machines, sanitation and transportation. But after 2061 B.S (since 3 KW Dhami Khola Ghatta Bijuli Project launched) all of the above things are available there. And the people are benefited with the knowledge of accessibility and they are utilizing them vigorously. All these are the features of the standard of living so the status of their life has been more standard. All of the above have been shown with following data given.

5.1.1 HOUSING CONDITION

Table 5.3.1

Housing condition of the selected household in the study area

Types of house	Number of house holds	
	Before the project	After the project
Straw roofed	24	15
Tin roofed	0	9

Source: Field Survey, 2011

It is clear that 100 percent households were living in straw roofed house made by mud and stone before the project. After the project has started 9 HHs have made tin roofed houses. From the figure it can be calculated that more people are still living in straw roofed house, which is the symptoms of low level of standards. Based on the Table 5.3.1, Figure 5.3.1 shows the condition of the selected HHs in the area.

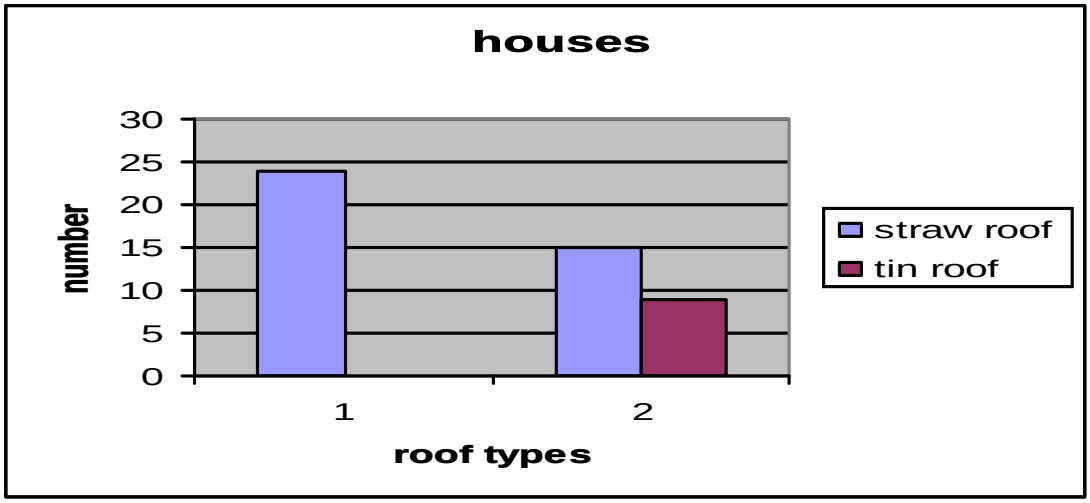


Fig. 5.3.1

Here position 1 in the chart shows the condition of roof of the houses before the project. And the position 2 shows the condition of roof of the houses after the project.

5.1.2 DRINKING WATER FACILITIES

Table 5.3.2

Source of Drinking water in the study area

	Number of households		Change in percentage
	Before the project	After the project	
Khola	24	8	-66.66
Piped water	0	16	66.66

Source: Field Survey, 2011

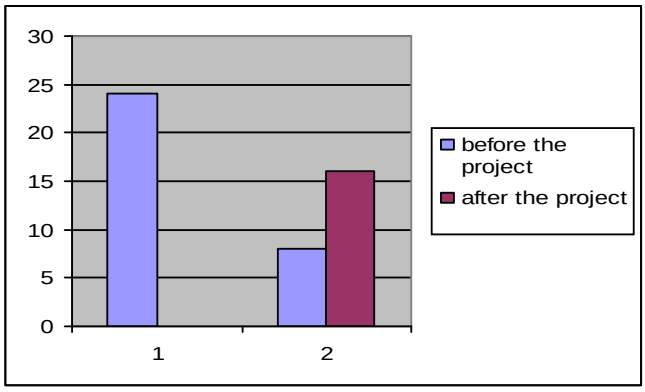


Fig 5.3.2

Here the position 1 in the chart shows the chart shows the number of people using various means of water resources for drinking before the project. All the HHs were dependent on the river water .For that they had to walk around 30 minutes to fetch a single bucket of water.

Due to open water sources, the villagers were suffered from various water borne diseases like typhoid, diarrhoea, jaundice. But now after the project has stared from 2060 B.S. one small water collection tank has been constructed .From that a water distribution pipe is connected to village. So all the 24 HHs are now using piped water.

5.1.3 IRRIGATION FACILITIES

Table 5.3.3

	Total HHs	Irrigated HHs	Types of production	Remarks
Before the project	24	o	Tradition types(maize , mustard)	Dependent on monsoon rain
After the project	24	11	Off seasonable /seasonable vegetable farming,	It is one of the main source of livelihood of the study area

Source: Field Survey, 2011

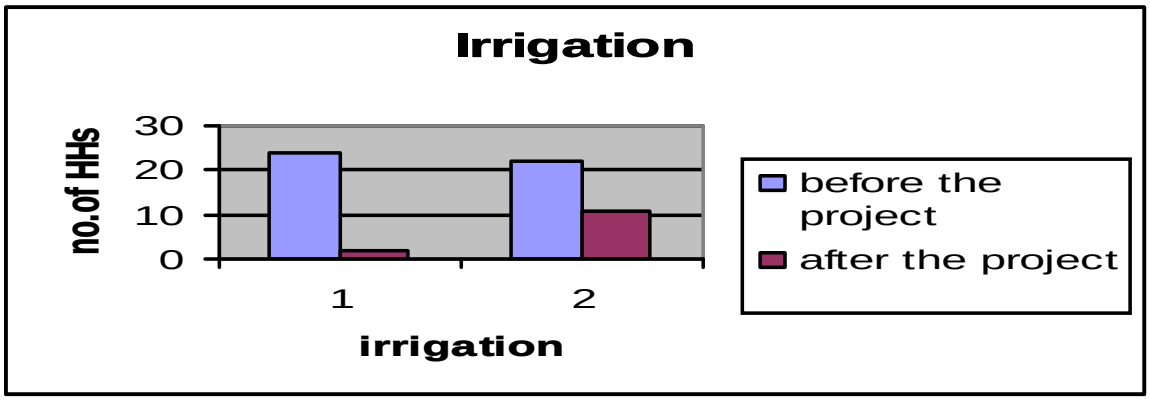


Fig 5.3.3

Here position1 in the chart shows the HHs using irrigation before the project. Here only 8.33 percent are irrigating their land. The source is the running small stream which dries up during dry season.

But position 2 in the chart shows the HHs using irrigation facilities after the project. Here 45.83 percent are irrigating their land. The source is the outlet water from 4 inch high density polythene pipe water exited from the Peltric set. It is round the year. The HHs living below the Peltric set is mainly benefited from it.

5.1.4 USE OF TOILET

Table 5.3.4

Sanitation Facilities in the study area

Types of toilet	Number of Households		Change in percentage
	Before the project	After the project	
Open(without cover)	4	0	-16.67
Deep hole cover	16	18	8.33
Modern	2	6	16.67

Source: Field Survey, 2011

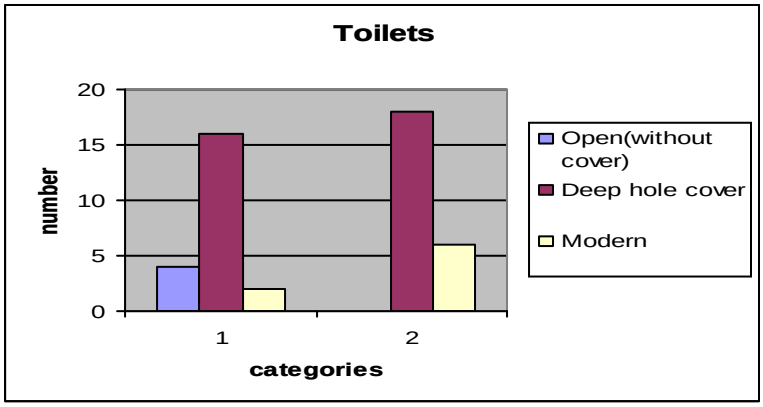


Fig 5.3.4

Here the position 1 in the chart shows the categories and number of toilets before 2061 B.S. Among 24 HHs, 2 didn't have toilets at their home before the project launched.

The position 2 in the chart shows the categories and number of toilets after 2061 B.S (the project started time).

At presents all the HHs has toilets at their home. No open defecation is seen in the village. During the survey, it has been found that after the construction of toilets, various communicable diseases has stopped.

5.1.5 EMPLOYMENT OPPORTUNITIES

Occupation of head of the family in the study area

Occupation	Number of households		Change in percentage
	Before the project	After the project	
Teacher	3	4	4
Office/service	2	5	12.5
Business	1	4	12.5
Agriculture	18	11	30

Source: Field Survey, 2011

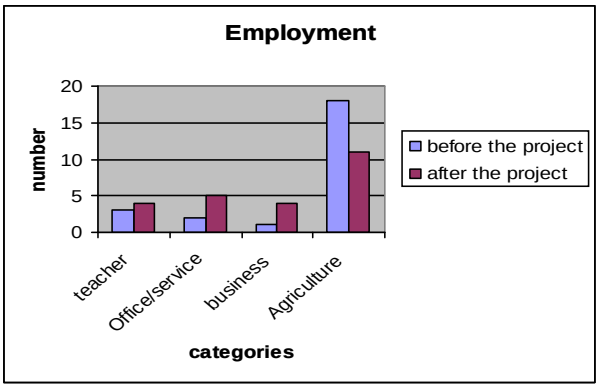


Fig 5.3.5

Here from the field survey, it is found that the types of occupation (of the head of the family) are mainly of four categories. Since after the start of the project, the people doing teaching, office/service and business has increased by 4, 12.5 and 12.5 percent respectively.

But interestingly the number of HHs, whose head of the family used to take agriculture as the profession drastically reduced by 30 percent. This is mainly due to migration of the youths towards the city area like Chapagaon, Lagankhel, Kathmandu and foreign countries for pursuing higher education and job. The electricity that reached village at 2061 BS has helped villagers to get quick information access through radio, televisions, and CDMA phones.

5.1.6FUEL USES

Table 5.3.6

Fuel uses for cooking

Sources	Number of HHS before the project	Percentage
Forest	24	100

Table 5.3.7

Sources	Number of households after the project	Percentage
Forest	5	21
Electricity	0	0
Gobar gas	19	79
Total	24	100

Source: Field Survey, 2011

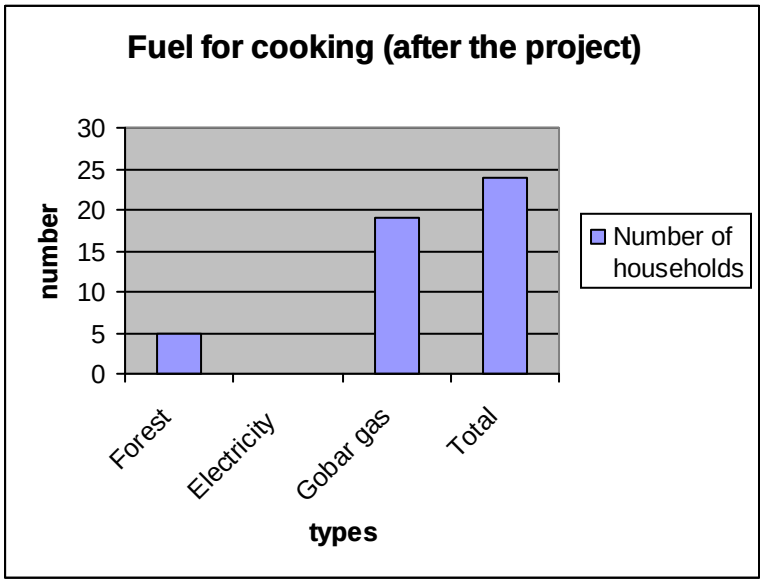


Fig 5.3.6

It has been found that before the project started all the 24 HHs 100 %) were directly dependent on forest products for cooking food. During that time, yearly flood at Dhami Khola river swept away hundred ropanies of arable land.

After the project started just 21 % of the HHs is dependent on the on forest products for coking. 19 HHs have now constructed Gobar gas plant. This was constructed in 2064B.S. The increased level of awareness due to information access through radio, television after the electrification of the settlement is the main cause for this. But none of the HHs use electricity for cooking as each HH has authority to consume only 100 w of electricity.

5.1.7 SUBSTITUTION OF ENERGY

Table 5.3.8

Substitution of Energy for lighting

Types of energy	Number of HHs		Change difference
	Pre-project	Post-project	
Kerosene	21	0	
Battery/ dry cell	3	0	
Electricity	0	24	
Total			

Source: Field Survey, 2011

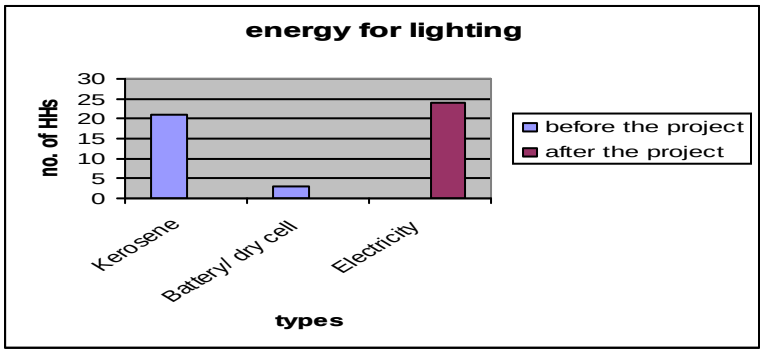


Fig 5.3.8

It has been found that for lighting purpose, before the project 87.5% of HH used kerosene for lighting.12.5 % of the HH used battery/ dry cell for lighting.

But after the project started, all the 24 HHs are using the electricity generated from Peltric set for lighting purpose.

5 road lights have been connected each, 40 watt. This has helped for the movement of people during night time for attending jatras, melas, emergency medical rescue, attending funeral rites etc .

5.1.8 POSITIVE IMPACT OF THE PROJECT AREA

S.NO	Impact	No. of households	No. of person	Remarks
1	Foreign employment	5	7	Information access to common people about foreign employment through T.V News. From the survey ,it is found that 7 person of 5 HHs have gone to Malaysia , Qatar to work.
2.	Road network connected	16	110	As people get exposed to the external world, they realized that the road can only bring development to them.
3.	Evening education	13		At local community center
4	Drinking water	24		The construction of dam for water collection for Peltric set running encouraged local people to make similar type of drinking water tank 50m up from the dam.
5	Load shedding			As the people from the nearby settlement , who use the electric line from the central grid faces 14 hours of load shedding, the people in the study site enjoys 24 hours regular power supply.
6	Irrigation and commercial agriculture	11		Though the number of HHs doing agriculture has reduced after the project construction, the 11 HHs below the Peltric set house enjoys the 12 months irrigation facilities through 4" pipe. This has encouraged them to do unseasonable vegetable farming.
7.	Movement of people during night time			5 road lights have been connected each,40 watt .This has helped for the movement of people during night time for attending jatras, melas, emergency medical rescue, attending funeral rites etc.

Source: Field Survey, 2011

5.1.9 NEGATIVE IMPACT OF THE PROJECT AREA

S.n	Impact	Remarks
1.	Fish displaced	No exact data. Due to construction of dam.
2.	Political capture	Fund in the name of Dam maintenance is misused by local political elites.
3.	MCB thrown	Each HHs can only use 100w electricity, otherwise the MCB trips down. But sometimes some houses who consume more electric power throw MCB and connect the electric cable to the main line. Such ill works is seen in the not functioning of the Peltric set.
4.	Outer technician dependency	The local people are not trained about the maintenance of the Peltric set.
5.	Ghatta unused	The project also had run Ghatta initially but a group work with out proper work division and good co-operation is always failed. So the Ghatta once become technically unused is not maintained yet.
6	Delay in the expansion of central electric line	Less priority of government on expansion as the area has already been electrified by the local water resources. But for the sustainability of the electrification, the area must be connected with central grid as local water resources may dry up due to global warming.
7	Government monitoring	No government authority has monitoring mechanism on the project due to which the project may lack sustainability in the absence of proper networking.

Field survey,2011

CHAPTER SIX:

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The Dhami Khola (3 KW) Peltric set is specially schemed to provide the electricity to the people of the adjoining area and this purpose is partially fulfilled.

1. This project imparted the excessive drinking water facilities to the local people and employment opportunities to both local and outsider people of the study area at the time of construction and operation of the project but these services and benefits could reach to more people, if the project has been well implemented.
2. Electricity supply has extended the social and recreation activities. Increasing education, purchase and use of tape recorders, used of TV, radios, bulbs shows increasing socio-economic activities of the people in the study area.
3. Physical structure of the project utilizes the fertile and hill land, which have impacted on potentiality of agriculture productions. Environmental mitigation measures have not been completely followed.
4. In terms, the impact of the project can be judged as moderate in absolute term and satisfactory in relative term, which mean similar in comparison to the other project.

6.2 RECOMMENDATIONS

The percent study reveals that the feasibility study and action plan for mitigation environmental problems resulted from the implementation of the project has not been properly considered and taken care of. The mitigation measures should have been closely monitored with the local NGOs or pressure groups.

1. This is suggested that there are also negative socio-economic impacts as well as positive socio-economic impacts are fewer than positive socio-economic impacts. Therefore, it should try to enlarge positive impacts and avoid negative impact, which would be beneficial.
2. It is suggested that the government authority must also take the partial responsibility for the proper maintenance, management, capacity building of the stakeholders, monitoring of the project.

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ANNEX-1

Name of respondents:

1. Binod Mahat
2. Krishna Prd. Timalsina
3. Ganesh Prd. Chaulagain
4. Krishna Prd. Chaulagain
5. Govinda Prd. Chaulagain
6. Ram Chandra Chaulagain
7. Ananda Chaulagain
8. Rajkumar Adhikari
9. Ishwor Adhikari
10. Balram Adhikari
11. Shree Krishna Adhikari
12. Hari Adhikari
13. Govinda Adhikari
14. Ramesh Adhikari
15. Raju Adhikari
16. Prem Prd. Mahat
17. Hari Sharan Mahat
18. Rajendra Mahat
19. Sundar Timalsina
20. Ram Prd. Ghimire
21. Hari Bdr. Singhtan
22. Krishna Bdr. Singhtan
23. Chiranjabi Singhtan
24. Ram Prd. Chaulagain

ANNEX-2

Field Checklist:

Date:

Time:

1. Spatial information

1.1 Study area

Elevation:	
Settlement	
VDC	
Ward no.	
District	
Zone	
Region	

1.2 Community/Social resource map:

1.2.1 Local infrastructures

1.3 Name of Place

Location	
Name of place	
Ward	
VDC	
District	Lalitpur
Zone	Bagmati

2 Institutions:

SN	Name of CBO	Formed date	Registered	No. of members	Major activities	Supporting agencies
1						
2						

3 Socioeconomic data:

3.1 Demography

SN	Beneficiaries Settlement	DAG	Janajati	Other	Total	Male	Female	Total
1								
2								
3								

Population H/H

3.2 Educational Status

Male Female Total

Educational status	(N)	(%)	(N)	(%)	(N)	(%)
Primary						
Lower secondary						
Secondary						
Higher Secondary						
College						
University						

4 Sample descriptions:

Census survey

Since the study area comprises only 25 HHs, so whole universe is taken for primary data collection

Name of the respondents	Toilets	Housing type	Additional employment	Drinking water	Irrigation
Binod Mahat					
Krishna Prd. Timalsina					
Ganesh Prd. Chaulagain					
Krishna Prd. Chaulagain					
Govinda Prd. Chaulagain					
Ram Chandra Chaulagain					
Ananda Chaulagain					
Rajkumar Adhikari					
Ishwor Adhikari					
Balram Adhikari					
Shree Krishna Adhikari					
Hari Adhikari					
Govinda Adhikari					
Ramesh Adhikari					
Raju Adhikari					
Prem Prd. Mahat					
Hari Sharan Mahat					
Rajendra Mahat					
Sundar Timalsina					
Ram Prd. Ghimire					
Hari Bdr. Singhtan					
Krishna Bdr. Singhtan					
Chiranjabi Singhtan					
Ram Prd. Chaulagain					

5 Major livelihood strategies

6 Major energy fulfillment strategies

7 Does the Peltric sets location fall inside or proximate to

National parks, wildlife reserves, hunting reserve

Conservational areas

Other protected areas

8 Does the Peltric sets alignment passes through forest?

Yes… No….

If yes, tick

State forest

Community forest

Religious forest

Private forest

Others……..

9 .Does the Peltric sets have any negative impact in the following?

Yes… No…..

If yes, tick

Temple, monasteries

Site for melas, jatras

Spots of mineral deposit

Local infrastructures (suspension bridge, water mill, irrigation structures)

Others……

10. Several sectors served by Peltric sets

Name	Type	Remarks

ANNEX-3 QUESTIONNAIRE

3.1 HOUSE-HOLD

House Hold Survey of…….
Sheet no: ……..
Questionnaire
Date: …….
1. Name
……..

2. Age
……

3. Address
…….vdc…….. ward no……. settlement

4. Family size
……
Male……. Female…..

5. Occupation……..

6. How much land do you have?

……Khet ……Bari

7. For how many months do the food that you grow once in a year (eg. Rice, maize, wheat) is sufficient for?
……

8. Electric lines connected at your house from Peltric sets (date)
……..

Analyzing situation before Peltric Set construction:

9. How was energy consumption managed at your house?
Forest……
livestock……
Others……..

10. What did you use for lighting your house?
Firewood……
kerosene……
Others……..

11. Mostly who went to forest to gather firewood?
……male
……female
……children

12. If you used Kerosene, how much liters of kerosene did you buy monthly?
……..liters per month

13. How much amount did kerosene per liter cost?
……..

14. How did children read at night?
……..firewood
……..kerosene
Others…….

15. What was the source of your drinking water?
……

16. Were any difficulties regarding that source?

Types	Remarks
steep slope travel	
far distance	
health related	
Others	

17. What was the source of your cooking food?
……..

18. Were any difficulties regarding that source?

Types	Remarks
steep slope travel	
far distance	

deforestation	
Others	

19. What was the source of your lighting?

……..

20. Were any difficulties regarding that source?

Types	Remarks
Fuel inaccessibility	
far distance	
deforestation	
Others	

Analyzing situation after Peltric Set construction:

21. How is energy consumption managed at your house?

……Forest
……livestock
……Others

22. What do you use for lighting your house?

……kerosene
……Peltric sets
……Others

23. Do you still go to forest for firewood collection?

……yes
……no
……Others.

24. How much power do you consumed at your house?

……..watt

25. How much do you pay to the "Dhami Khola Gatte-Bijuli group" for power purchasing?

……

Analyzing the social impact of Peltric set:

26. Is there reduction on migration?
……yes
……no
……Others

27. Is Peltric set easy to be operated by women?
……yes
……no
……Others

28. Do students use the electric light to read and write at evening time?
……yes
……no
……Others

Analyzing the economic impact of Peltric set:

29. Is this energy used for grain grindings?
……yes
……no
……Others

30. Are there any micro industries established by electric energy generated by Peltric set?
……yes
……no
……Others

31. Do you see any other positive impact of the project in the area?

Impact	Remarks

32. Do you see any other negative impact of the project in the area?

Impact	Remarks

ANNEX 4

Photo 1: A photo showing the Peltric set house, pipe line lay up to Peltric set house, and nearby houses.

Photo 2: A photo showing 3 kw Peltric set

Photo3: A photo showing the land being irrigated.

Photo 4: Vegetable farming

Photo 5: A Gobar gas plant at Ram Chandra Chaulagain's **house. It** is used for cooking purpose.

Photo 6: The grain grinding stone (jaato) is not in used.

Photo 7: Electricity distribution pole and lines.

Photo 8: Researcher engaged in data collection

Photo 9: A MCB connected to main line. MCB is connected to each 24 HHs, such that each HH can consume only 100w electricity.

Photo 10 Gotikhel Bazar, Photo copy out from Google Earth

Photo 11 Road under construction and electricity users community

Photo 12 Gotikhel Bazar

The End

TABLE OF CONTENTS