

# CHAPTER - I

## INTRODUCTION

### 1.1 Background

Nepal is situated in the Northern hemisphere known as land of Mount Everest and the birthplace of Lord Buddha and is located between two fastest growing economies of the world-India and China. Nepal is a landlocked country in the world. The country has an extreme topography and climate. Nepal is one of the richest countries of the natural resources and bio-diversities. Among these resources, water is the one which is abundance and immense potential. Nepal has massive potentialities for Hydro-power development. The total hydro-power generation potentiality of various rivers is estimated to be approximately 83000 MW on which 4200 MW is economically and technically viable (MoF, 2017/18). Thus, in the context of Nepal it is the based alternative among the various others energy.

For the potentiality of Hydro-power development Nepal is the second largest country behind Brazil in the world, which is first position in Asia. There are more than 6000 river and various sources (river of snow, spring, lake, fountains well, monsoon etc.) of water resources (Bista,2011), Nepal occupies 2.77 percent of total theoretically hydropower generation capacity in the world"(MoF, 2017/18). Hydropower is a renewable source of energy that is considered to be the one of the best alternative due to its cost effectiveness pollution free nature.

Hydropower is the one of the cleanest renewable and environmentally beginning source of energy. Harnessing of water resources on large scale could provide significant contribution to the poverty reduction and employment generation. So integrated water resources development plants are essential for the overall development of the country. The development of the hydropower does not only bring a social transformation of the local level but also creates a resources pool. Nepal has been a lot of water resources and yet, people are living dark and dependent fuel wood, animal dong and imported petroleum goods for our energy problem such as non-availability of market as well as difficult physical condition are cited on the reason.

The history of small scale and hydropower in Nepal began with the traditional water mills or Ghattas used for grinding flower. The 500 kilowatt Pharping power plant, which was commissioned in 1911, is first hydropower installation in Nepal. In 1936 the 644 kW Sundarijal hydropower plant was commissioned in 1956 the 2.4 MW Panauti hydropower plant was installed (Nepal Electricity Authority).

The 144 MW Kaligandaki A hydropower project commissioned in 2003 is the biggest hydropower in Nepal so far. The 92 MW Kulekhani hydropower plant (I & II) commissioned in 1982 is the only project offering seasonal water strong in Nepal. Most of the hydropower plants in Nepal are owned by the governmental agency called Nepal Electricity Authority (NEA).

In fiscal year 2017/18, electricity production has been increased by 7.4 percent and reached to 1044.6 MW. During this period, 3496 circuit km of transmission line has been built. The number of electricity consumer has reached to 3 million 592 thousand, and total length of distribution line has reached to 135 thousands km. In the current FY 2017/18, the demand for electricity is 1508.2 MW and the difference between demand and supply is 463.6 MW (Economic Survey 2017/18).

Up to the mid-march 2018, out of the 1044.6 MW of total electricity generation, 990.5 MW from hydropower, 53.4MW from thermal plant and 0.7 MW of electricity from solar plant has been generated. During this period, 503.4 MW of hydropower produced from the projects owned by the (NEA) and 483.2 MW of hydropower produced by the private sector has been connected to the national grid (Mof, 2017/18).

Although, hydropower is considered as a major natural advantage of Nepal, Its development has been extremely challenging. The challenges are directly related to technical, economic, social as well as political problems in Nepal. Technical Problems are related to country's geographical, topographical and hydrological features. That provides large complications for the development of hydropower project. Government instability is also a serious issue in development of this sector.

## 1.2 Statement of Problem

Nepal is an underdeveloped country where majority of the people are dependent on agriculture which is traditional and subsistence nature. The main sources of energy of rural habits are traditional source whereas the urban have the luxury of using electricity and other sources of energy.

Nepal is known as a rich country in hydro resources. There are more than 600 hundreds rivers having potential of 83,000 MW electricity (Bista, Raghu Bir, 2011 Economics of Nepal). These perennial river systems carry about 225 billion cubic meter of water every year and flow down to India Ocean via India. The roots of Nepal have given priority to the hydropower. On the other hands most of Nepalese cant has opportunity to use electricity they are living with kerosene lamps. Without electricity new factories, industries and daily activities like business in not possible. Revenue to the state is generated from industrial production which requires electric energy. Nepal has a least opportunity for production is not available most of the countries of the world. The generation of hydropower is environmentally friendly and resources required available in Nepal. The main challenge is harness this vast potentiality.

Hydroelectricity is the most of important source of energy and provides infrastructure for economic development. It is necessary for the development of agriculture trade, commerce, transport, social, educational etc. of an economy. It not only helps to reduce the unemployment but may help to break the vicious circle of poverty. If Nepal has harnessed its full potential, the country could be meat its domestic demand for electricity as well as export electricity, thus boosting the national income(K.C KHADGA).

Hydropower development in Nepal is a herculean task because most of the projects are loss-making project so; none of the project is without troubles. The peace of the river to slow industry season so, generation of electricity is low, in other words this cannot generate electricity in full capacity so the country compels to do load shedding. In this scenario, this thesis is focused on the following questions:

- i) What is the socio-economic status of the individuals and households in the study area?

- ii) What is the impact of hydropower project on education and health of the Shree Krishana Gandaki VDC?

### **1.3 Objectives of the Study**

The general objective of this study is to explore the impact of Kaligandaki Hydropower Plant is the socio-economic impact on rural people through income, saving and employment generation. The specific objectives of the study are as follows:

- i. To examine the socio economic status of the individuals and households in the study area.
- ii. To explore the impact of Kaligandaki hydro project on Health and Education in Shree Krishna Gandaki VDC of Syangja District.

### **1.4 Significance of the Study**

Energy has always been a vital factor of development. In the context of Nepal, Hydroelectricity is one of the main sources of energy that has potential to accelerate the economic development. Although it has it potentiality, its development has been extremely challenges; directly related to the technical, economic, social as well as political problem in Nepal. The problems are enhanced in case of large hydropower plants.

Hydropower is economic, nonpolluting and environmentally began source of energy out of 83,000 MW potential, only 50 percent is technically feasible. But till the date, the installed capacity in Nepal Electricity Authority is only 1044.6 MW and about 80 MW is under construction. That means less than one percent has been developed out of which 99 percent yet to be developed in the line of the fact, research analysis and development of hydropower is very essential from the view of economic development of the nation and uplifts the overall economic condition of the people of Nepal. (Economic survey 2017/18).

In Nepal by utilizing fuel, wood for domestic consumption the forest is going to be collapsed. Therefore, electricity is the only source of energy domestic purpose, which prevents the deforestation. Even in the remote areas, that lack of the roads, hydroelectricity can generated in micro scale to provide the energy for village for heating and cooling purpose. These will considerable check the degradation of forest on one hand on the other hand it may from the various cottage and small scale industries. If electricity becomes sufficient for cooking, lighting and transporting people will get much benefit from it because electricity is much cheaper than the imported oil. Therefore, this study would helpful to other researcher, planners, universities student, policy makers, interested and related personals.

While the development of a Kaligandaki hydropower is massive hydro project in Nepal. The electricity can raise the living standard of the people advantages of electricity are:

Electricity makes human life easier by providing domestic as well as none, domestic facilities creates employment opportunities in the presence of electricity, electronic devices may be available. They improved both quality and quantity of communication and education to the overall community.

Electricity help to discover, develop, expand, promote new technique and technologies in the various sector.

Electricity helps to develop infrastructures, which are preconditions for the economic development. Development of electricity ad infrastructure has correlated with very much other.

Improve in extracurricular activities which helps to raise the living standard of the people as well as electricity helps to improved overall sector of the economy.

As electricity is significant in the development so the researcher has conducted a researcher as a Kaligandaki hydropower project. This study will be helpful and resourceful in the following ways.

Possibly this is a first research about the Social- economic impact of Kaligandaki hydropower especially for Shree Krishana Ganadaki village of Nepal. However many

research of micro, small, middle and large hydropower projects have been already done.

An outcome from this research many are helpful to other individuals and institutions to implement programs effectively such type of project.

Socio economic impacts of this project inform us the role of project in the socio economic impact of a community.

Finding of this research may be valuable information to those people's institutions that are interested about people of related area.

In short, the importance of Kaligandaki hydro project is increasing in socio-economic aspect of the society. Therefore, the study which attempts to identify the socio economic impacts of this Kaligandaki hydropower project in significant at present.

## **1.5 Limitation of the Study**

This research is a part of academic degree. It is mainly focused on socio-economics' implication of Kaligandaki Hydropower in development of Nepal. The conclusion of this study may not fully apply throughout something can be drawn to other project area.

This study is focused on impact of Kaligandaki Hydropower on health and education at the local area. In the context, the research problem of this proposal is to examine the models of investment in the development of hydropower in Nepal. The main constraints are time and financial factor of hydropower in Nepal.

## **CHAPTER - II**

### **REVIEW OF LITERATURE**

There are many studies in the Kaligandaki hydro projects. Generally, the study on hydropower projects has been conducted to identify Socio-economic impacts on health and education sectoring the Shree Krishana Gandaki village. Numbers of the studies have been carried out in this field in different countries; most of them installed hydro project to fulfill the demand of power, which is cheap, and environment friendly renewable energy sources. It is the best energy sources for the overall country electrification. This study focuses on the socio- economic impacts of the Kaligandaki hydropower plant in the Shree Krishana Gangdaki village of Nepal and its sustainability.

This chapter reviews the previous studies from journal, reviewed textbook, working papers, discussion papers, research reports and theses and dissertation both in national and international arena focusing on socio-economic impact on people about educational and health sector.

#### **2.1 Introduction**

In 21th century, electricity is no longer a luxurious but it needs of people everywhere. Hydropower is a white energy due to its non- polluting and renewable characteristics which can be integrate with irrigation and water supply; it is synonymous with a better standard of living and vital for better communication, health care and reduced physical labor.

Limited research has been conducted on energy, socio-economic and environmental impacts of Large-hydropower scheme projects. There are many studies in other sector of micro-hydro projects. Generally, the studies on medium and large, small, mini and micro-scale hydropower projects have been conducted to identify various types of impacts created by the rural development of mini-hydropower projects. Numbers of the studies have been carried out in this field in different countries; most of them installed KHP to fulfill the demand of power which is cheap and environment friendly

renewable energy sources. It is the best energy sources for the rural maintaining countryside electrification. This study focuses on the socio- economic impacts of the large hydropower plant in the remote areas of Nepal and its sustainability.

This chapter reviews the previous studies from journal, reviewed text book, working papers, discussion papers, research reports and theses and dissertation both in national and international arena focusing on socio- economic impact on kaligandaki hydropower in Shree Krishana VDC Syanga.

## **2.2 Studies at international level**

IEA (2010), according to the international energy agency 1.4 billion people have no access to electricity ,small scale hydropower (SHP) can sometimes to be an economically viable supply source in thesis circumstance, as SHP can provide a decentralized electricity supply in those rural areas that have adequate hydropower technical potential (Egre and Milewski 2002). In fact SHPS already play has been important role in the economic development of some remote rural areas. Small-scale hydropower –based rural electrification in china one of the most successful examples, where over 45000 small hydropower plants totaling 55gw have been built that are producing 160 TWHh (0.58EJ) annually. Those many of these plants are used in centralized electricity and are providing services to over 300 million people (Liu, Hu 2010). More generally,SHPS is found in isolated grids as well as in off –grid and central –grid setting. As 75% of costs are site-specific, proper site selection is a key challenge. Additionally, in isolated grid system,natural seasonal flow variations might require that hydropower plants to be combined with other generation sources in order to ensure continuous supply during dry periods (world bank, 2008) and may have excess production during wet seasons: such factors need to considered in the planning process (Sundqvist & Warlind 2006)

In general,SHPs

- i. Are often but certainly not always ROR schemes
- ii. can use existing infrastructure such as dams or irrigation channels;
- iii. are located close to village to avoid expansive high-voltage distribution equipment  
;

- iv. can use pumps as the turbines and motors as a generators for a turbine generator set; and
- v. have a high level of local content both in terms of materials and work force during the construction period and local materials for the civil works .

A recent examples from western Canada 18 shows that SHP might also be a solution for remote communities in development countries by replacing fossil-fired diesel generation with hydropower generation. All in all, the development of SHP for rural areas involves environmental, social, technical and economic consideration. Local management, ownership and community participation, technology transfer and capacity building are basic issues for sustainable SHP plan in such circumstance.

DFID (1999) published an article “Community Micro-Hydro in LDCs: Adoption, Management and Poverty Impact.” Energy is an important factor in rural development. Lack of energy is often a constraint that holds people back from achieving a better life-style. Many routine jobs that rural people need to do provide for their basic needs, demand energy. This energy can be provided manually, which demand hard work from the people involved and takes a large amount of time. An external source of energy releases people from the drudgery and allows them to be far more productive in their use of time. In hilly areas of the world , one source of energy is that from moving water. Small turbine technology has been developed in many countries that can allow both shaft power and electricity to be generated from streams flowing down hillside cheaply and efficiently . shaft power can be used directly to drive machinery that can do many of the tasks that have been traditionally done by hand .the classic examples is food processing .rice hulling , the grinding of grains to flour and pressing of food oil seeds are very laborious task if done by hand .the uses of energy allows these tasks to be done much more quickly . the recovery of oil from oil seeds is also much larger is done mechanically. The availability of energy also allows a range of productive tasks that would not otherwise be possible . New village industries can be set up that can be used to earn income for villagers. Alternative ,high value crops and other produce can be grown and processed for sale to towns and even for export this includes products such as tea or coffee, fruit juices or spices.

Micro hydropower has proved very successful as a tool to help rural develop their economic position and improve their life style. It provides extra energy in rural area to

reduce the drudgery of food processing and it can offer a means of generating electric power in areas well away from the grid. The success of any programs using such a technology depends on a wide range of factor that must all be considered and covered effectively. These include the manufacture and installation of the technology itself, but also making sure the technology is used for purposes for which people have a felt need and which are economically viable. The financing of the installation of the technology through loans and subsidies is another area that needs careful planning over a term of several years.

BRODMAN (1981) has depicted the socio-economic impact of klaten rural hydropower project in Indonesia. This study is primly based on primary data. This study has found 88 percent of the business in the study area had installed electricity of project,77 percent of the electricity adopters with school children reported that electricity has caused in increase in their study time, more than 80% of respondents said that electricity had made the village safer due to lightening of the village paths, more than 70 percent of electricity adopters and non-adopters opined that electricity had benefit them by stimulating night time activity . business work hours of had increased 11 percent of the interviewed household increase their income by using electricity in their home industries , 33 percent of the business respondent and 43percent of household respondents said that employment opportunities had increased due to electrification .

Therefore his study has thus concluded that rural electrification is the most viable and most benefited sources of energy in the rural area. Thus he concluded that kalten rural hydropower has contributed to enhance the living conditions and expand the capabilities of the people in java in a clean and sustainable way.

### **2.3 Reviews of Study at National level**

Regmi (2012)analyzed the present condition of Nepalese energy system. The summary conclusions of her findings are: There should be need of proper utilization of Natural resources like water to achieve the goal of development. By proper harvesting of rest water resources, by generating aptly trained manpower and investment on water resources dependency on foreign country could be vanished, One of the alternative ways to increase the energy power not only by the formation of new

hydro projects but also the maintaining and optimizing the existing hydropower plants which may become panacea to control the web of problem and has been grossly overlooked for these reasons. The development of hydropower in Nepal has always been dictated by many constraints and conditions. Projects are selected by planning procedure which is deliberately designed to produce a ' no option ' situation in decision making. It is too late to understand the government that private sector is not capable to develop sufficient hydropower projects to satisfy the demand so the public sector must play a sustainable and major role for implementation of hydropower project.

Gurung (2003) focused on situation of utilization of the expenditure pattern on water field. He mainly focused on: Hydro energy becomes prime for the sustainable development for civilization, industrialization and development, so hydro energy is essential for equitable development. Similarly if we can generate the hydropower then it is boon for the environment. Environment friendly projects in this polluted world are hot cake for investors so they look forward to hearing this in near future. Energy becomes essentials for construction and mining and for the mining purposes deep drilling activities are possible by using hydro energy.

Pandey (2008) explained that Energy is important for basic need of development. Without energy the pace of development cannot be accelerated. The development of all productive sector of an economy depends on development of the energy sector. In general there are two types of sources of energy: traditional and commercial. Most of the electricity is supplied to important centers and far from villages of hills and mountains. The settlements are found to be scattered. The status of entrepreneurship in hills and mountains is very poor because the agriculture is that subsistence level and there is very little commercialization of agriculture. It is expected that with electrification, they might get the chance to create investment opportunities in rural areas. Nepal heavily depends upon forest for energy sources and livestock feeding both in summer and winter.

Thus it is concluded that the project has mixed impact. The project has brought both positive and negative impact. On one hand, there has been reduction in the flow of downstream, and has reduced agricultural output, raised the temperature and fisherman are deprived from their traditional jobs. On the other hand, the project

has generated employment, skill development and increased access to piped drinking water. Above all, the project has helped in raising literacy through the program and religious conversion has also grown up.

Awasthi (2010) examined the socio-economic impacts of Chameliya Hydropower plant in the adjoining area. This study has concluded that the socio-economic impacts of the project are moderate in absolute term and satisfactory in relative term. The project has provided sufficient drinking water and employment opportunities to the local people and electricity supply has extended the social and recreational activities like increasing educational standard, purchase of radio, television, tape recorders etc.

K.C (2007) has given the argument on the importance of hydroelectricity for the economic development. He tried to present the benefits from investment of huge amount on hydroelectricity. He tried to find out the current or real situation of investment trend on the hydroelectricity. He focused his studies on the water is white energy and is panacea to develop the country. So we should focus the overall development of hydro energy. Internal source of energy should be used on the development of the hydroelectricity, Consumption of traditional energy gradually replaced by the modern form of energy.

JHA(1955) concluded that the rural energy development in general and small hydropower development in particular, should be viewed as an opportunity to overcome energy constraints in agriculture, cottage industry, tourism transportation and communication. The provision of electricity provides a new impetus for sustainable rural development through the infusion of modern technology and new skills. This results in higher labor productivity.

Modernization of agriculture and promotion of cottage and small scale of industry are essential to bring about the transformation of all the hill economy of Nepal towards a more sustainable form. The generation of off-farm employment and off farm income is more desirable than extending sustainable farming activities. Which have led to deforestation, soil erosion and landslide.

Given the essentially environment friendly nature of small hydro, goal of environmental preservation can be readily achieved through the strengthening of local and center level regulatory institutions, fine tuning of regulatory framework, and setting up

of funding mechanisms and organizations. Therefore setting up of a “small hydropower development fund SHPDF”.

KOIRALA (2012) has described the impact on enhancement of education status, improvement on health status and awareness on information and entrepreneurship of people live in Bhotodar V.D.C as a whole . People gain lighting facilities which helps to increase study more and which helps to decrease dieses by reduce indoor pollution .people are aware on T.V. with their health by watching health programmed on T.V. and listening on radio. The acquirement and utilize of physical assets such as electric appliance has increased access to information . the verdict of impact of middle Marsyangdi hydropower project has been accomplished below.

NEUPANE (2068) shows that this project is not only significance for the western Nepal. It is the major alternative source of our country, which can play vital role to strength the economy of it. The biggest project of Nepal, KHP produces  $\frac{1}{4}$  part of the electricity a lot for the economic, social and other aspect of local level too. For the economic development and to push further the energy crisis in Nepal it an such project are to be promoted which can upgrade our status. if we win be able to upgrade such important and easier alternative sources then it is sure that we won't become economic independent only but also we can export this resources and gain competitive market in the world community. It would increase the import of foreign currency and attracts many foreign investors to invest in such projects; here we all know that we are the second richest country in the water resources.

In the present context the government of Nepal has declared our country as the energy crisis period. Due to this, to develop our country by the strength base of hydropower project, Nepal separates more economy for the construction of hydropower project .it has aimed eliminated “(load shedding)” problem from Nepal and spread the ray of electricity in the dunk paths. Due to this, the creeping motion of the development of hydropower has achieved the rabbit motion and we can see that the “Tamakoshi” 456 MW is going to be built from the economy sources of Nepalese.

KAFLE(2015) has showed the positive impact on income and employment. it helps to raise in income and employment by helping in the establishment of new business . KHP reduce the expenditure on different energy in the rural area. By the use of KHP the health condition also gets improved who don't have KHP use maximum firewood

as light or lamp and cooking but those people who have KHP has reduce which helps to convert forest . Electricity is closely related with human lite therefore,a respondent who have use of KHP have been changed their living standard. The status of sanitation has improved by use of KHP. By the use of Kaligandaki hydropower-studying hours of student have been improve then non-users. Kaligandaki hydropower users have improved their education status. Reduce the expenditure on different energy sources like firewood kerosene, biogas etc. Therefore, it can be less expensive source of energy in the rural area. To repair, maintain operation for the Kaligandaki hydropower management committee is fully responsible.

KADEL (2013) Munthala khola micro hydro power project has a upbeat impact on enhance most of education status, improvement on health status and awareness information. And entrepreneurship of people live in dhamja V.D.C as a whole people gain lighting facilities whips helps to increase study more and which helps to decrease diseases by reduce indoor pollution .the acquirement and utilize of physical assets such as electric appliances has increased access to information. The verdict of impact of Nunthala Khola microhydropower project has been accomplished below.

K. C (2013 )examined the hydroelectricity is the most of versatile source of energy and provides infrastructure for economic development. It's necessary for the development of agriculture trade, commerce transport etc. of an economy. It not only helps to reduce the unemployment but also may help to break the vicious circle of poverty. If Nepal has harnessed its full potential, the country could be meat its domestic demand for electricity as well as export electricity, thus boosting the national income in the history of hydropower development in Nepal is more than 100 years Pharping hydropower house is the first powerhouse installed in Nepal, which is one of the oldest hydropower in Asia. Although hydroelectricity generation received priority in every development plan, the plan where poorly implemented. As a result, It's development is still in infant stage lack of electricity remained a major constraint to economic development and poverty alleviation .currently Nepal is harnessing 652 MW hydropower energy while the peak demand was about 946.10 MW in January 2011. This short fall was being managed by server loan load shedding (18.30 hour per day) import power from in India and thermal generation it also spends large amount of foreign currency to import petroleum products.

Adhakari (2014) examined the effect of hydroelectricity and GDP is the major objective of this study. There is no disagreement among the economist about the productivity of hydroelectricity, so this section explores the empirical relationship between hydroelectricity and GDP. The study showed that constant or intercept coefficient (a) is 128.392 which shown that average effect of hydroelectricity contribution on dependent variable i.e. GDP and price are zero or other variable exclude from the model is positive. The result shows that the coefficient of electricity (b1) is 0.249, which explains that one percent change on electricity contribution causes 24.9 percent change in GDP, holding other thing constant. It means there is positive (+ve) relationship between electricity contribution and GDP.

The coefficient of determinants  $R^2$  is 0.629 which depicts that around 62.9 percent variation of GDP is determined the explanatory variable (electricity contribution). As such as the calculated 'f' value is greater than tabulated 'f' value. So the overall regression line is significant and its shows a better association between the variable in the equation.

Bhusal (2015) examined the Aadhikhola hydro projects are specifically installed for the electrification at the local level, as it has not been connected to the national grid. Electrification in the discrete has been continuous processes a most of VDCs are now electrified by the power provided by this project the project is going throw the process of up gradation in it power generation capacity. Our study has revealed varies positive impact electrification has bought on education and health. It has mapped out the problems regarding sustainability of the project and the necessary are measure to solve it which can be concluded as follows:

The project has been helpful for the up liftmen of literacy rate of local people of the study are this been contributing in the increasing the literacy sate. Dropout ratio of local children has decreased and study hours has increased because of electrification. The literacy level of women and positive way for the achievement of millennium development goal in education.

- Electrification of the study area as brought improvement of health of individuals the number of people affected with disease that has relation with electricity was found to be decreases. The frequency of visit to hospital has increased which shows an increases in the number of health intuition and

increases in medical facilities at local level. The number of days spent on hospital increased because of which identification of diseases and expenditure on health of each household has increased.

## CHAPTER-III

### RESEARCH METHODOLOGY

#### 3.1 Introduction to the Study Area

Syangja district lies in the Gandaki zone of Nepal, which is one of the seventy-seven districts of Nepal. The study area of this research is Shree Krishna V.D.C of Syangja district of western development region. This VDC lies in the western part of the district. It takes about 2 hour to reach the district headquarter, Syangja, from the study area. The Capacity of Kaligandaki Hydropower is 144 MW which is situated at Shree Krishna Gandaki VDC of Syangja District. Kaligandaki hydroelectric power station is situated near Mirmi of Syangja district about 300 km from Pokhara in the same direction in Nepal. The hydropower project is also the biggest hydropower project of Nepal. The dam and headwork's are situated on the Gandaki River at the confluence of the Andhikhola whereas the power house is located downstream, around a bend in the river, in Beltari (About 7 km towards the South-East of Mirmi). A 5.9KM (3.7mi) long headrace tunnel connect the reservoir to the power station which contains three 48 mw Francis turbine generators. Altogether, there are 370 household in the village with 1560 inhabitants male 700 and female 860. The average HH size in 4.21 (CBS 2011). In the survey area, 60-sample household are taken to find the socioeconomic impact of KHP on household, role of KHP for sustainable change in project-affected areas. Out of the total 60 respondents higher number of respondents (12) were taken from ward no 6 where large number of Brahmin people are live there where list no of 3 where from ward no 9 likewise, (4) respondents were taken from ward no 1 and (7) respondents were taken from ward no 2. And (5) respondents were taken from ward no 3. Likewise, (11) respondents were taken from ward no 4 and (4) respondents were taken from ward no 6 and (9) respondents were taken from ward no 7. Krishana Gandaki is traditional Brahmin village which more than 60 percent of the household are occupied by Brahmin people and the remaining household belong to Magar, Chhatri of occupational castes or Dalit such as Bote and Damai. Agriculture is the main source of subsistence in Gandaki supplemented by animal husbandry.

## **3.2 Research Design**

This study is mainly based on up on quantitative data as it is fact finding investigation with adequate interpretation in the context of social research . It is more specific than exploratory study as it aims to identify the various socio-economic characteristics of the community.

## **3.3 Source of Data**

### **3.3.1 Primary Data**

Primary information was collected from the field survey. Questionnaire is method is used for data collection.

A questionnaire was developed prior the Kaligandaki hydropower visit. The questionnaire covers demography, health and sanitation, agriculture and animal husbandry, sufficiency of a agriculture product, income and expenditure pattern, human resources, woman and children sources of fuel, kind of stove and electricity. Add the context of questionnaire total 45 household who are considered as directly project affected families and they were selected to full up questionnaire.

## **3.4 Data Analysis**

Primary as well as secondary data has been used in this study. Since this study is a case study and data analysis has been focused particularly on the primary data, which were collected by using various methods of primary data collections, secondary as well primary data have been presented in table pie chart ,simple bar diagrams sub-divided or component bar diagrams and multiple bar diagrams have been used to analyze as well as secondary data sub divided or component bar diagram and multiple bar diagrams have also used to analyze primary as well secondary data in this study.

### 3.5 Population, Sample and Sampling Procedure

Shree krishana V.D.C has 370 households that have been closely affected by the hydropower project. So, the population of the study is 370 households. The study area and respondents were selected by using census satisfied propositional random sampling methods. Out of which 60 households were selected as sample households under the proportional distribution in the 9 wards of the VDC as shown in table.

**Table 3.1: Ward wise Sample Distribution**

<b>Ward No</b>	<b>Total HHs</b>	<b>%</b>	<b>Total sample HHs</b>
1	32	8.64	4
2	45	12.16	7
3	36	9.72	5
4	51	13.78	11
5	33	8.91	4
6	53	14.32	12
7	50	13.5	9
8	39	10.50	5
9	31	8.37	3
<b>Total</b>	<b>370</b>	<b>100</b>	<b>60</b>

## **CHAPTER- IV**

### **SOCIO-ECONOMIC STATUS OF THE STUDY AREA**

#### **4.1 Introduction**

This chapter the appropriate data and information for achieving the objectives of the study and deriving the major finding of the study. First of all it presents the brief introduction Shree Krishana Gandaki VDCs with demographic features. This chapters deal with analysis of impact of Kaligandaki hydropower on health, education, and income and information technology Shree Krishana Gandaki VDCs. The impact of Kaligandaki hydropower on education and information technology would be analyzed by comparing gradual changes on socio economic condition of the Shree Krishana Gandaki VDC by the access of electricity by comparing with before and after the questionnaire and observation was analyzed in the descriptive from.

Socio economic Features if the study area depicts the development status of the village. The sociologies and economic characteristics situation have a significant influence in the economy of the village and living standard of the people.

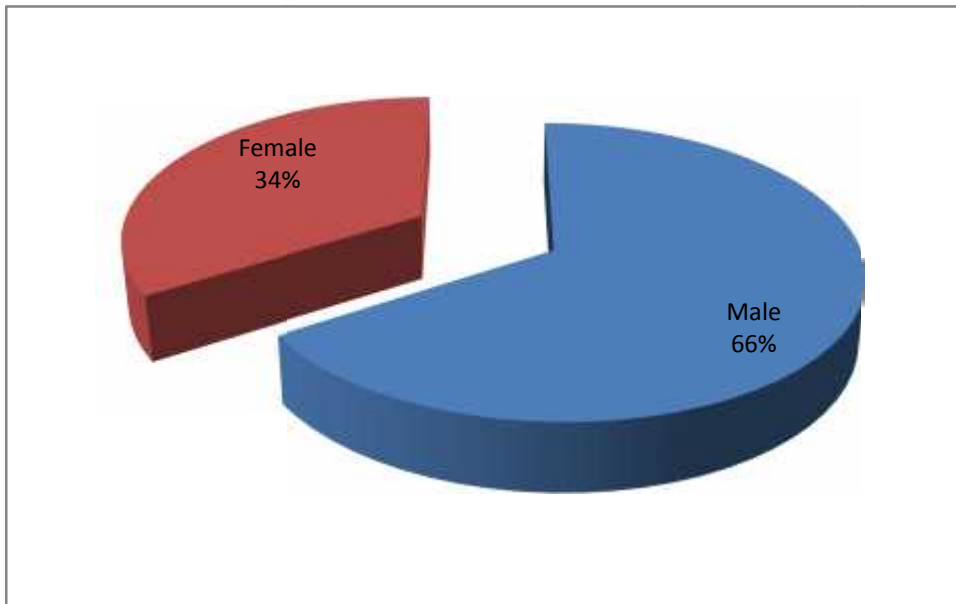
#### **4.2 Socio-Economic Profile**

There may be so many impacts of everything; Kaligandaki hydropower project has influenced various aspects of social and economic aspect of human being in the Shree Krishana Gandaki VDCs. This study is focused specially what types of change occurred in social as well as economic sector. For detail different related data are tabulated and interpreted follow.

##### **4.2.1 Respondent by Gender**

Regarding gender there was a significant imbalance in the participation of respondents. The ratio of male and female is got nearly 50-50%. But participation respondents were fewer numbers for this research in the study area. There was only 34% were female and 66% were male respondents. The gender wise participation percent of respondent of the study area is presented in following figure 4.1

Figure 4.1: Gender of the respondent (%)



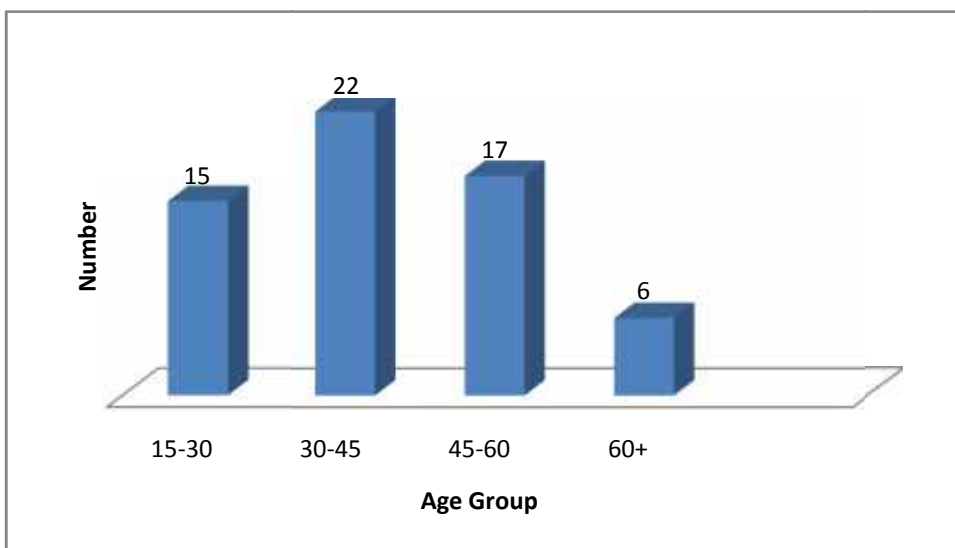
Source, field survey, 2017

Figure 4.1 Shows that most of the respondent is the male, which clearly shows that, in the study area still remote village where female are back warded in their role.

#### 4.2.2 Age of the Respondents

The respondents are divided into four groups. The questionnaires were asked to the respondent aging above 15 years. Then it divided into four groups as 15-30, 30-45, 45-60 and 60+. This is shown as bellow.

Figure 4.2: Age Group



Source: field survey 2017

The figure 4.2 shows that high number of respondents (22) are from 30-45 age group similarly age group 45-60, 15-30 and 60 above are 17, 15 and 6 number of people respectively. This shows that most of the respondent are for young group.

### 4.2.3 Cast\Ethnicity of Respondent

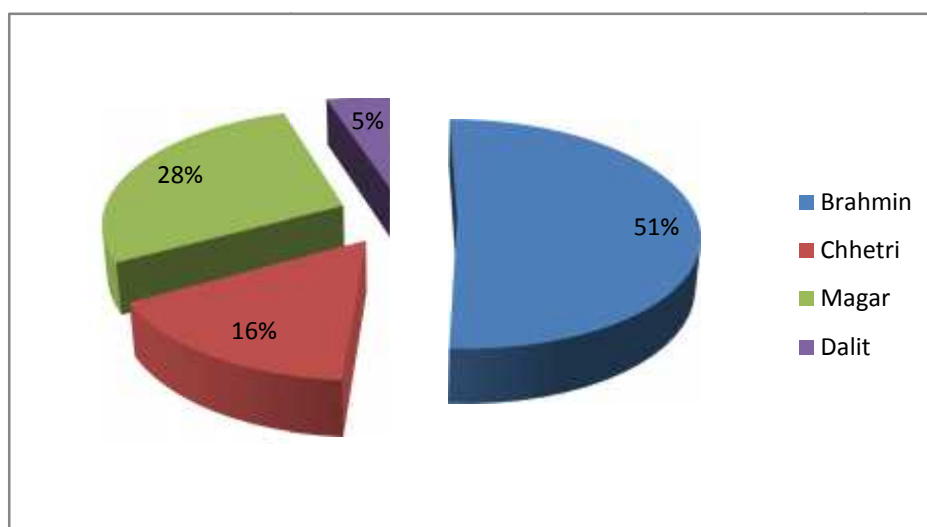
Nepalese society also have got various cast like Brahmin, Chhetri, Dalit, Janajati etc. among the total population of the study area the majority of the people are Brahmin(51%), Chhetri (16%), Magar (28%) and Dalit (5%). Nepali language is the common language in the community. The Table 4.1 shows the distribution of respondents by cast/ethnic group.

**Table 4.1:Distribution of Respondents by Caste/ Ethnicity**

Cast and Ethnic Group	Brahmin	Chhetri	Magar	Dalit
Number of Respondent	31(51%)	9(16%)	17(28%)	3(5%)

The table 4.1 clearly shows that in the study area the majority of the respondents are Brahmin people then Chhetri, magar and Dalit respectively. Brahmin respondents are 31(51%) out of 60 respondents and Chhetri respondents are 9(16%) , Magar 17(28%) and Dalit 3(5%) which is shows as given figure below.

Figure 4.3 : Caste/Ethnicity of Respondent (in %)



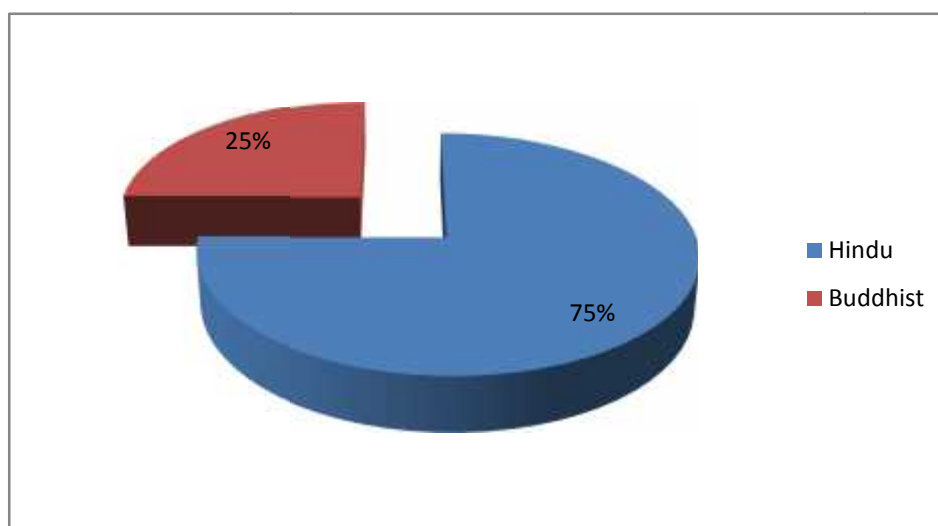
Source: Field survey 2017

The figure 4.3 clearly shows that in the study area more than fifty percent of the people are Brahmin and second largest is Magar. Chhetri and Dalit are comparatively low percentage.

#### 4.2.4 Demographic Characteristics by Religion

According to the census 2011 there are 81.3 percent of the people follow Hinduism. While Buddhism 9 percent, Islam 4.4percent, Kirat 3.1 percent and Christian 1.4 percent. In the study area Respondents Religion practice got Hinduism and Buddhism. The respondent ratio according to the religion is presented as flows.

**Figure 4.4: Demographic Characteristics by Religion (in %)**



Source: Field survey 2017

The figure 4.4 represented that majority 75 percent of the total people religion practiced is Hinduism and rest of people follows by Buddhist religion.

#### 4.2.5 Main Occupation of Household

Agriculture is predominant occupation in project area flowed by livestock farming, poultry, alcohol fermentation weaving cloths and sacks from the wild nettle plant, and waving various Bamboo products, such as wooden threshers. Remittance is another income source of household in the village.

Non agriculture economic activities in affected VDC that 26 percent of households are not engaged in such activities and distribution of household engaged in various types of activities is provided as follows.

**Table 4.2:**

**Occupational Distribution of Household**

Occupation of the respondents	Percentage (%)
Agriculture	62.6
Service	22
Foreign Employment	11.4
Others	3

Source: Field Survey 2017.

According to above data, out of the economically active population 62.6 percent are involved in agriculture sector and 22 percent are in service the other areas are in 11.4 percent foreign employment and 3 percent in other employment.

### **4.3 Social Impact**

This section describes to socio impact of hydropower .This study is focused especially what types of change occurred in social as well as economic sector. Then what kinds of effect have seen in environment after the plan implemented. For details different related data are tabulated and interpreted as follows.

#### **4.3.1 Status of Sanitation**

Electricity is also known as modern technology therefore it is attempted to find out the status of sanitation after electricity in the study area. After hydropower lunched, the overall status of sanitation had increased which is presented in the table 4.5 below

**Table 4.3**

**Status of Sanitation after Electricity**

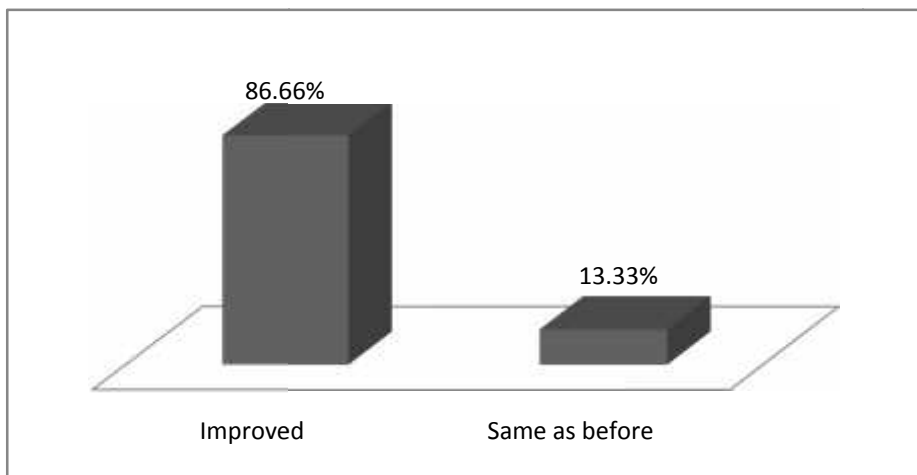
Status	Number	Percent
Improved	52	86.66
Same as before	8	13.33
Total	60	100

Source: Field Survey 2017.

The table shows the status of sanitation after electricity with reference to environmental impact. Out of 60 respondents maximum proportion i.e. 52 (86.66%) reported the sanitation is improved. Remaining 8 (13.33%) reported there is not any change occurred in sanitation after electricity i.e. same as before.

**Figure.4.5**

**Status of sanitation after Electricity**



To sum up, who have proper knowledge that what is the use of electricity those people changed their behavior and cared about indoor and outdoor sanitation? It is proved that most of the negligence about sanitation happened at the time of night. But after electricity have been using the lighting time to remove the pollution.

#### 4. 3. 2. Effect in Safe Drinking Water

Context of the safe drinking water in the study are clearly shows that there is almost no any effect after the hydro project lunched. Below table 4.6 presents the effect of hydro projects in the safe drinking water supply in the study area.

**Table 4.4**

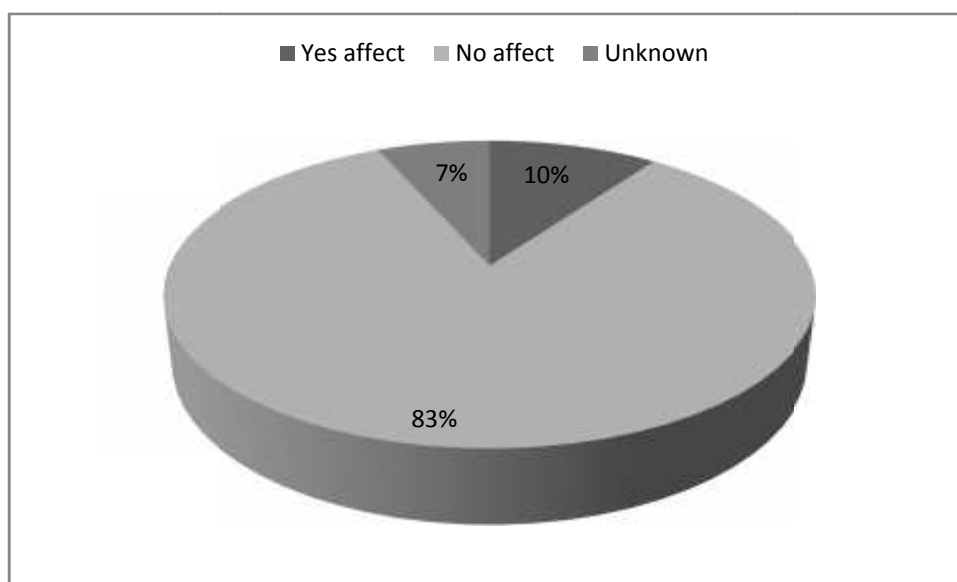
**Effect of hydropower in Safe Drinking Water Supply**

<b>Effect</b>	<b>Number</b>	<b>Percent</b>
Yes effect	6	10
No effect	50	83
Unknown	4	7
Total	60	100.00

*Source: Field Survey, 2017*

**Figure 4.6**

**Effect of Project in Safe Drinking Water Supply**



Source: Field survey, 2017

Out of the total 60 respondents, maximum proportion i.e. 50(83%) reported that the project has not affected on drinking water. Only 4 (7%) respondents reported that they are unknown about any kinds of effects. There are 6 (10%) respondents told the project affected on drinking water. In addition, it can be proved that the hydropower also some help for safe drinking water supply in the village.

**4.3.3 Status of Education**

Nepal is stated is second position with reference to water resource in the world. Most of the rural areas of Nepal have been dark at the night. People have been using kerosene and burning firewood for light. By this situation schooling aged generation is mostly affected. It is attempted to find out in the table and figure what is the status of student's education after electricity?

**4.3.3.1 Effects on Children Study Habits after Electricity**

After KHP the study habits of children have, raised 97% households are agreed that the performance of the children has improved in the school than before. In

the rural sector, in the absence of electricity, the students (children) are obliged to use kerosene lamp while studying in evening and night time by this situation schooling, aged generation is mostly affected. They cannot study for long time due to the deficiency of enough kerosene and deem light.

**Table 4.5**

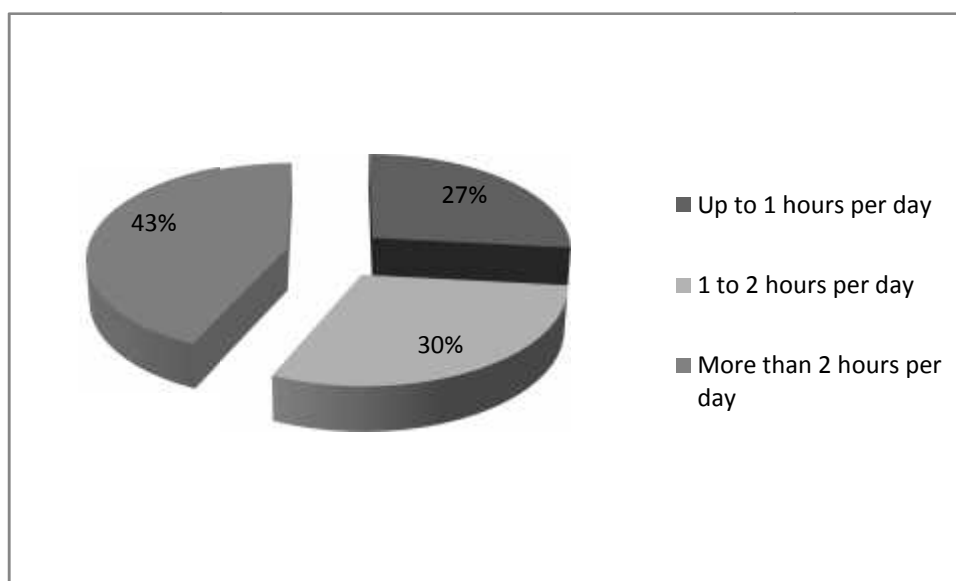
**Effects on Children Study Habits after Electricity**

Increased hours	Number	Percent
Up to 1 hours per day	16	27
1 to 2 hours per day	18	30
More than 2 hours per day	26	43
Total	60	100

Source: Field Survey 2017

**Figure 4.7**

**Effects on Children Study Habits after Electricity**



Out of the total 60 sample, 26 (43.0%) households children raised their study time more than two hours, 18 (30.0%) households children raised 1 to 2 hours and 16 (27.0%) households children raised up to 1 hours only. Hence, most of the guardian of schooling children found that their children have been studying at the night time using electricity by this new situation, it can be said that most of the student's educational status is improved after electricity planted.

#### **4.3.4 Change in Children's Daily Activities Using Electronic Instruments (TV/Radio/Computer)**

The uses of electrical instruments have caused multiple changes on children's behaviors. Almost all the children of the project affected areas got positive changes and learn many things by watching TV or using computer some negative outcomes such as watching TV for long time, play game in computer mobile etc. the table shows the improvement percentage on children activities on various aspects.

**Table 4.6**

**Change in Children's Activities Using Electronic Instruments (TV/Radio/Computer)**

<b>Child's Activities</b>	<b>Improved</b>		<b>Not Improved</b>	
	<b>Number</b>	<b>Percent</b>	<b>Number</b>	<b>Percent</b>
Talking Style	32	78.04	9	21.46
Dress Up	26	68.42	12	31.58
Sport	22	56.41	17	43.59
Reading Habits	20	74.04	7	25.96
Dance	26	74.28	9	25.72

Source: Field Survey, 2017

Above the table shows the change in children's activities using electronic instruments. According to this table maximum respondents children's activities has improved after

KHP. Their children’s activities like talking style, dress up, sport, reading habits and dance are improved than before.

#### 4.3.5 Feeling/Concept of People

Feeling or concepts refers the any kind of response towards and things. people have either satisfaction or dissatisfaction toward electricity. What they have been feeling Kaligandaki hydropower established. It is attempted to find out that what are the feeling of people towards electricity in this study area.

**Table 4.7:**

Feeling of people towards kaligandaki hydropower

Feeling	Number	Percent
Very Satisfied	19	31.67
Satisfied	30	50
Natural	11	18.33
Non-Satisfied	0.00	0.00

Source: Field Survey, 2017

Among total 60 respondents highest proportion i.e. 30(50%) reported that they are satisfied by electricity service. The lowest proportion i.e. only 11(18.33)respondents reported they are natural and remaining 19(31.67%) respondent reported very satisfied. there are no non-satisfied respondents in study area of Kaligandaki hydropower.

In addition electricity facility is closely related with human life. it is not only necessary in day time, but also in night time. Electricity made the human life easier and comfortable. It is also able, to make the whole world as a on state. In rural area electricity is a strange thing. So must of the respondents are satisfied the way Kaligandaki hydropower.

#### **4.3.6 Change seen in Village after Kaligandaki hydropower**

Electricity is a crucial element in encouragement local development. Kaligandaki hydropower station a form of appropriate technology, have allowed poorer regions of the world to transform their lives by using a piece of technology that is suited to their needs. According to the interviewed respondents, The village electrification has brought series of positive changes in the daily livelihoods .Having access to electricity, women can grind their grains on modern agro-processing mills ,which is faster and more efficient than traditional water wheel. Similarly, bright electric light in the homes extend the evening hours for women and can engage in other income generating activities including weaving clothes and fermenting alcohol. Owing to the access to electricity, village have good facilities for mass communication media through code division multiple access (CDMA) telephone sets and TV. Mobile Telephone are also available in the village. The village even has and internet facility. This study found that household in Rivan are willing to invest more on energy and other electric appliances. Owing to the access to electricity, the academic performance of children is greatly influenced in Rivan. Electric lights in households extend the day providing additional hours for evening reading and also, reduced drudgery for children. However, having access to electricity, adult education classes were conducted by ACAP, and illiterate people were highly encouraged to participate in this programmed. The informal education conducted by ACAP brought a significant change in the social structure within short period of time. Village announced 'khulla disa mukta chhera' ,which help to improve their health.

#### **4.3.7 Attraction of Project in society**

In addition modern services directly and indirectly affects in traditional attitudes, eating, speaking, clothing, and behavior. So kaligandaki hydropower has also affected in social and cultural properties.

**Table 4.8:**

**Factor affected by project.**

Factors	Number	Percent
Improved health	15	25
Time saving	18	30
Easy to work at night	10	16.67
Increase in reading habit	12	20
Others	5	8.33
Total	60	100

Source: Field survey, 2017

The table represents the respondents attraction towards project, so it is attempted to find out the factors affected by the Kaligandagi hydropower. There for the question is asked for them what are the factors attracted by the plant? In this question among the total 60 respondents, high proportion i.e. 18(30 %) reported time saving. Lowest propitiation I .e 5(8.33%) reported in other factors. Like was increase in reading habit 12(20%) improve health 15(25%) easy to work night 10(16.67%) respectively .To sum up, when electricity facility, is available there increases the use of audio, video visual media and internet. Those types of media new generation can emitter or copy of everything's that they have heard or saw. So it is proved that projects has attracts has attracted in social.

#### **4.4. Economic impact of the KHP**

##### **4.4.1 Change in Living Standard**

The modern facilities mostly affects in human being. After using such facilities it is expected that there must change in living standard of human. Actually living standard refers to the higher living. The study area's households are using the electrical goods and instrument like TV, computer, fridge, rice cooker etc. they are getting different kinds of electrical facilities in the outside of their house. There are so

many electrical facilities in their area which has directly affected by hydroelectricity. By which reason, they have felt changes in living standard to make easier their life. The table 4.2 shows that aggregate using status of electrical facilities after KHP.

**Table 4.9:**

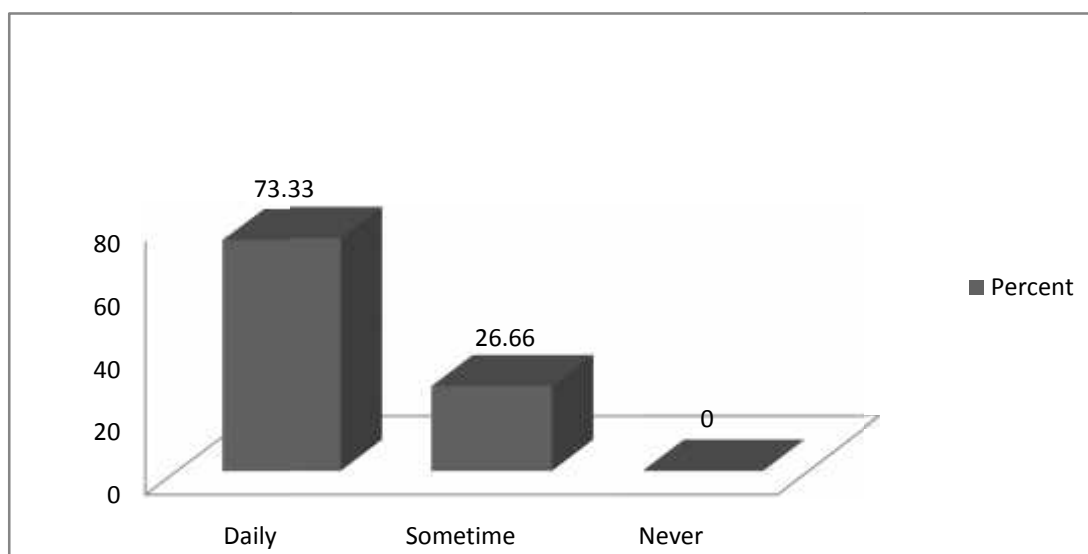
**Status of Using the Electrical Facilities after Hydropower**

Using Status	Number	Percent
Daily	44	73.33
Sometime	16	26.66
Never	0	0.00
Total	60	100.00

Source: Field Survey 2017

**Figure 4.8:**

**Status of Using the Electrical Facilities after Hydropower**



It is expected that modern facility like electricity may effect in human life style. So, this table shows the using status of electrical facilities of respondents. The question was asked to respondents that have their living standard been changed or no. After the hydropower plant, all respondents i.e. 60 (100%) reported that living standard has

been changed after the hydropower. However, they are unable to use the electrical facilities continuously. Above these table 4.3.1 respondents i.e. (73.33%) only uses the electrical facilities daily. In addition, it is proved that electricity is one of the most affecting factors of living standard.

#### **4.4.2 People’s Perception about the income after Hydropower**

The respondents who have able to use the electricity properly, who have sufficient knowledge and ways about electricity facilities, they have been able to increase family income. Those people who have credit of loan when interested in hydropower, they reported that their family income not increased, some of the respondents income neither increased nor decreased. They are living in neutral position even after electricity. The percentage and the number of households about income generation/increase after hydropower are presented the table and figure below.

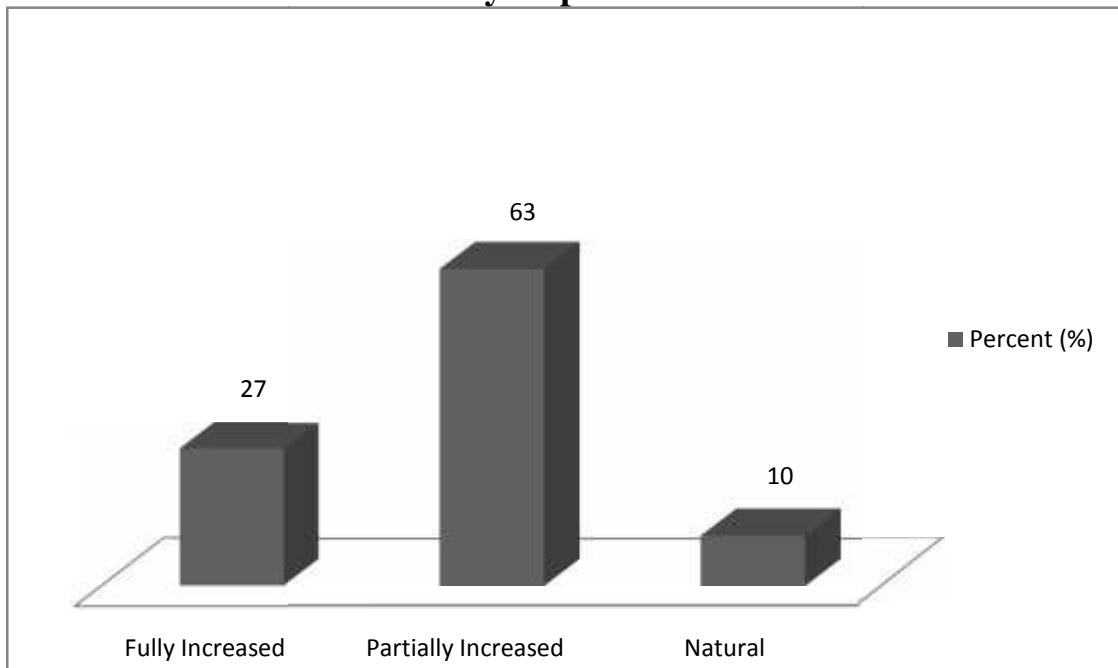
**Table 4.10:**

#### **People’s Perception about the income in their income after hydropower**

<b>Status</b>	<b>Number</b>	<b>Percent</b>
Fully Increased	16	27
Partially Increased	38	63
Neutral	6	10
Total	60	100.00

Source: Field Survey, 2017

**Figure 4.9:**  
**People’s Perception about the Income in their Income after Hydropower**



The table shows that the status of people’s perception about the income in their income after hydropower. Out of total 60 respondents highest proportion i.e. 63 % reported that their family income has partially increased. Among 60 respondents, only 10% respondents reported their family income is in neutral situation. 27% respondents reported that their income has fully increased after hydropower

#### **4.4.3 Agriculture Product Promotion due to Kaligandaki Hydropower**

In our country more than 66 percent people are involved in agriculture. This study area being the Shree Krishana Gandaki village, 80 percent people here adopt the agriculture but not fully dependent on that. Around 73.33 percent people have not been sufficient to raise their product directly and indirectly after KHP. The people perception about agriculture product is presented below.

**Table 4.11:**

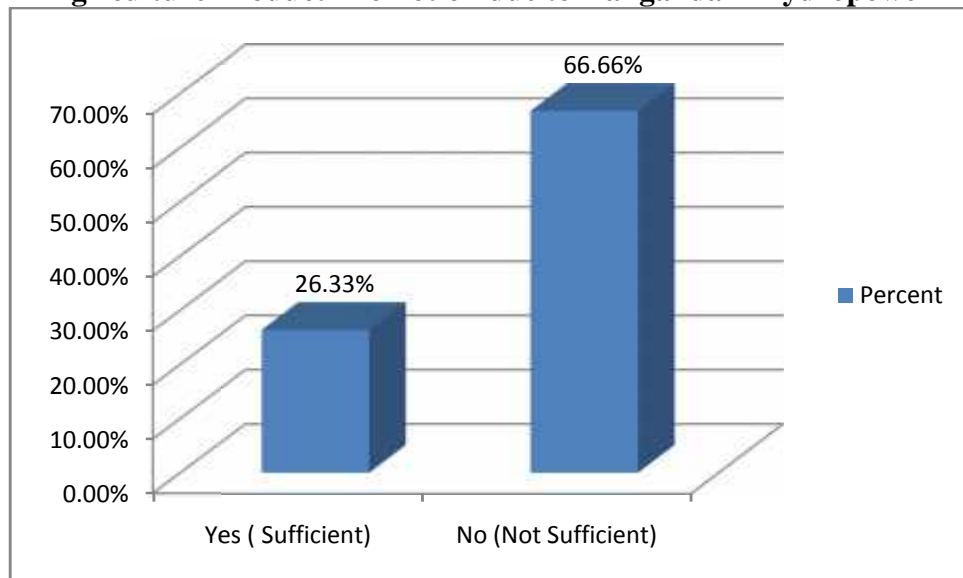
**Agriculture Product Promotion due to Kaligandaki Hydropower**

Status	Number	Percent
Yes ( Sufficient)	16	26.66
No (Not Sufficient)	44	73.33
Total	60	100.00

Source: Field Survey,2017

**Figure 4.10:**

**Agriculture Product Promotion due to Kaligandaki Hydropower**



Source: Field Survey, 2017.

The table and figure shows that maximum proportion i.e 44. (66.66%) out of 60 respondents reported that they are unable to meet their annual agriculture product promotion. Remaining 16 (26.33%) respondents reported they are able to meet their agriculture product promotion due to Kaligandaki hydropower.

The sum up Dalit and Janajati are known as backward and indigenous. So they have not proper land for cropping and livestock and unable to meet their basic need as well as annual food demand. Those people who has medium level land and other grassy land they are able to promote agriculture product.

#### 4.4.4 Establishment of Industries

Electricity is main foundation of any kinds of industries. Without electricity no one industries can be conducted. The life is very difficult as well as being backward due to able to use modern technology in the absence of power. After Kaligandaki hydropower, people lunched various industries in this study area, which help to raise the income level of the people as well as make the villagers way of living much easier. The firms that lunched after Kaligandaki hydropower in study area. Although the Kaligandaki hydropower is known as small scale but it is attempted to find out that what types of industries are there established?

**Table 4.12:**

#### **Establishment of Industries after Electricity**

<b>Firms</b>	<b>No. of Industries/Firms</b>
Poultry Firm	6
Knitting Industries	9
Furniture	6
Sawmill	2
Agro mill	5
Computer Institute	3
Press	1
Motor workshop	2
Total	34

*Source: Field Survey, 2017*

The table 4.6 shows that people installed 34 small industries/firms/institutes where around 61 people have partially/fully job. The people's life becomes easier after installed agro mill and able to generate income from these firms. Students have gain computer knowledge from the computer institutes. People are using different kinds of instruments of wood in various uses from furniture industries. The others business such as food shop, stationary, medical and photo studio has been run which generate the income as well as make the social life easy too.

#### **4.4.5 Advantage of Kaligandaki Hydropower in Locality.**

Kaligandaki hydropower projects played the vital role on the life-habits and livelihoods assets of household. The direct effects on life habits that were identified during fieldwork in the study area. Changes in daily activities and reduction the uses of fossil, strength thinking of livelihoods assets. And improvement in capital. One major change for the women, who already have a lot to do, have been the new electric powered mill in the village. Children study under light bulbs and adults gather around radios and televisions. In addition to reduction in drudgery, a result of electricity has been change in use of kerosene by household in the research sites. Almost every household visited in study area owned a cell phone. By lunching the poultry forms, rice mill, sawmill, bakery, industry, medical, and others business help to generate economic activities and improve the economic condition of the villagers. Kaligandaki hydropower helps to raise the social condition, improvement of health, increased in reading habits of the village.

#### **4.4.6 Condition of Employment after KHP**

Because of the locally produced technology. KHP macro benefits have also be analyzed. Especially of employment creation, investment in environmentally friendly technology and development of small and decentralized industrial infrastructure are some of benefits to the nation. After the installation of the project, The employment opportunities in the village have raised directly and indirectly. This also indicated that with rigorous operation practice in operational support, generation can be increased in facture. There are some people are working for house-wiring jobs in project sites. Their for employment sector of the country can profit from KHP installation. once employment opportunities are increased in decentralized way providing access and opportunities to the poor people , the sustainability of rural society can be promoted.

#### **4.4.7 People Perception about the increases age income after KHP**

People are engaged in different work for promoting their source of income such as agriculture produce and other locally available natural natural resources etc. The lighting facilities have helped them to increase their working hours. People who have able to use the electricity properly, who have sufficient knowledge and ways about electricity facilities; they have been able to increases family income.

**Table 4.13:**

**People's Perception about the increase the income after KHP**

Total number of respondent 60			
Yes	No	Difficult to say	To some extent
30	10	12	8
percent	16.66	20	13.33

Source; field survey 2017

Figure 4.12 shows that 16.66% of respondent income neither increased nor decreased. They are living in natural position even after electricity .out of the total 50% respondents reported that their family income has partially increased. Among the 60 respondents, only 16.66% respondent reported their income is natural situation .However, among them 20% respondent reported that difficult to say. Most of people got raised their income level partially/fully by getting chance to involve on different activities.

## CHAPTER V

### SUMMARY, CONCLUSION AND RECOMMENDATION

#### 5.1 Summary

Energy is an important factor in rural development. Lack of energy is often a constraint that holds people back from achieving a better life-style. Without energy, the pace of development cannot be accelerated. The development of all the productive sector of an economy depends on development of the energy sector. In general, there are two types of energy: traditional and commercial. Nepal has a great hydropower potential with its more 6000 far from village of hills and mountains. In the study area, the settlements are found to be scattered. The status of entrepreneurship in hills and mountain is commercialization of agriculture. It is expected that with electrification, they might get the chance to create investment opportunities in rural areas.

In hilly areas of the world, one source of energy is that from moving water. Small turbine technology has been development in many countries that can allow both shaft power and electricity to be generated from small streams flowing down hillsides cheaply and efficiently. Big hydropower has proved very successful as a tool to help rural people develop their economic position and improve their life-style. It provides extra energy in a rural area to reduce drudgery of food processing and it can offer a means of generating electric power in areas well away from the grid. The success of any program using considered and covered effectively. These include the manufacture and installation of the technology itself, but also making sure the technology is used for purposes for which people have a felt need and which are economically viable.

This study find that a Kaligandaki hydropower had a significant impact on the consumption of firewood in rural households. It was revealed that Shree krishna V.D.C. children have lesser propensity to go for wood collection once their homes have been connected to the Kaligandaki hydropower. Similarly, modern electric lights in the house holds allow more time for students to conduct their study during night time. Access reduces drudgery for women in village allowing them to have enough time to be involved in other house hold related activities including income- generation and social community development activities.

## **5.2 Conclusion**

Kaligandaki hydropower project is not specifically installed for the electrification at the local level as it has been connected to the national grid. Electrification in this district has been a continuous process as most of the VDC's are now electrified by the power provided by this project. The project is going through the process of up gradation in its power generation capacity. The study has revealed various contributions on education, health and economy. It has mapped out the contribution income and employment by the project and the necessary measures to solve it which can be concluded as follows:

Kaligandaki hydropower project has positive impact on income and employment. It helps to rise in income and employment by helping in the establishment of new business. Respondents have started to use electronic devices therefore hydropower project has affected on social and cultural properties like changing in clothing, knowledge and thinking. Hydropower project reduces the expenditure on different energy source of energy in the rural area. By the use of hydropower, the health condition also is improved. Major environmental pollution has not been seen after the project but minor pollution has been found. Students have been using evening time for study therefore; it is found that study habits of students have improved. And their educational activities also positively changed. Electrification of the study area has brought improvement of health of individuals. The number of people affected with disease that has relation with electricity was found to be decreased. The frequency of visit to hospital has increased which shows an increase in the number of health institutions and increase in medical facilities at local level.

### **5.3 Recommendations**

However, due to lack of technical and financial as well as entrepreneurial skills, majority of the existing Kaligandaki hydropower plants are out of function in Nepal. Kaligandaki hydropower project is suffering from a series of problems including lack of funds, technical and non-technical problems, low load factors, and ineffective policing measures. The status of Kaligandaki hydropower revealed that decentralized energy-access plans and budgets often adequately take into account the capacity development. Although, the rural electrification campaign begun before 40 years ago, the status of electric coverage via national gridline in rural areas is unrealistic and implausible. Currently, subscribers are enjoying the low tariffs of electricity in Shreekrishna V.D.C. The Kaligandaki hydropower plant is getting older but to date there is no concrete plan for regular performance observation. According to the plant manager the power supply can be halted at any time if something goes wrong with the generator. There is no savings and longer will there be technical support from ACAP. In order to use electricity from the existing plant, the VEC has to increase tariffs. In addition, meters should be replaced in each household in order to control and monitor the efficient usage of electricity. Local technical capacity should be strengthened. The improved cooking stove (Sudhariyako Chulo) program can become additional agent for reducing pressure on natural forests. Therefore, a detailed analysis would help to find the critical point regarding how much electricity has to be available for a significant change in poor rural livelihoods.

Additionally, a policy measure for an increase in the number of Kaligandaki hydropower installations in rural areas of Nepal has to be ensured. The establishment of an energy regulator, with the responsibility to oversee the rural energy sector, ensure fairness and promote transparency and competition, would encourage the private entrepreneur in development of the rural energy sector.

## REFERENCE:

- Adhikari, J. (2014). *Hydroelectricity economy* M.A. thesis: Central Department of Economics, T.U. Kritipur.
- Awasti, R. (2010). *Socio-economic impact of Chameliya hydropower project on the adjoining area*: An unpublished M.A thesis submitted to the center department of economics, T.U.
- Bista. R. (2011). *Economic of Nepal*: New Hira Books enterprises, Kritipur.
- Bhusal, K. (2015). *Socio-economic impact of Aadhikhola hydropower plant and health an education*: An unpublished M.A thesis submitted to the center department of economics, T.U.
- Broadmen, J. (1981). *Socio-economic impact of rural electrification*: lesson from central java, a paper presented in workshop 'small scale hydropower technology' Application in rural setting held at Bangkok, Thailand.
- Central Bureau of Statistics, (2014). *Statistical Year Book of Nepal*: Various Issues, Thapathali, Kathmandu.
- DFID (1999), *Socio-economic effects of micro-hydro in Nepal, srilanka, Ethiopia and Uganda*: Department of economics, the University of Reading.
- Gurung, A. & Bryceson, I. (2003). *Socio-Economic Impact of a Micro Hydropower Plant on Rural Livelihood*: Scientific Research and Essays, DOI: 10.5897/SRE 10. 766; Vol. 6, No. 19, 2003.
- International Energy Agency (2010), *Renewable Energy Essentials, Hydropower*: Paris, France.
- Jha, H.B. (1995). *Sustainable development of small hydropower in Nepal*: CETS, Lalitpur.
- Khadga, K. (2013). *Contribution of hydroelectricity in economics development of Nepal*: An unpublished M.A thesis submitted to the center department of economics, T.U.

- Kadel, M. (2013). *Socio economic impact micro hydro project of Dhamja VDC*: An unpublished M.A thesis submitted to the center department of economics, T.U.
- Kafle, Y.N. (2015). *Socio-economic impact of Kayakhola microhydropower*:An unpublished M.A thesis submitted to the center department of economics, T.U.
- Koirala, S. (2012).*Socio economic impact of middle Marshyandi hydroproject in lamjung district*:Thesis submitted to central department of rural development. T.U.Kritipur.
- MoF (2018). *Economic Survey Fiscal Year 2013/14*. kathmandu: Government of Nepal.
- Neupane, S.P. (2068). *An assiment of hydropower development in Nepal*. An unpublished M.A thesis submitted to the center department of economics, T.U.
- Pandey, (2008).*Socio-economic impact of Jhimruk Hydropower project*: An unpublished Master Thesis, T.U, Kathmandu, Nepal.
- Vidyut(2012). Nepal electricity authority, kathmandu Nepal

## APPENDIX

### QUESTIONNAIRE

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University Campus, kirtipur

Tribhuvan University, Kathmandu

A survey on socio-economics impact of Kali Gandaki Hydropower in Shree Krishana V.D.C Syangja .This questionnaire is primarily designed for the the thesis writing purpose of M A in Economics of T.U. You are kindly requested to fill of this questionnaire as instructed bellow:

Household information					
1Name:-	1.2 Ward No:-				
3Gender:-	1.4Age:-				
<table border="1"><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>					1.6 Occupation:-
5No of HH Members:-					
7Caste:-	1.8Weligion:-				





2.7 If there is any changes in disease after electrification?		
Diseases	Decrease(Please tick	
Respiratory		
Eye-aching		
Headache		
Heart diseases		
Others		

2.8 Does your family have a Toilet? (Please tick )

- a) Yes                      b) No

If yes, what kind of toilet do you have

- a) Pakki                      b) kachhi

2.9 Does any family member suffer from any kind of illness in past year? (Please tick )

If where they were treated (Please tick )

- At home by local herbs      b) Health post medicine    c) doctor

2.10 Did any child birth on your family in past one year? (Please tick )

- a) Yes                      b) No

If yes, where she gave birth?

- Home                      b) Hospital

2.11 Does any family member dead in the last one year (Please tick )

- a) Yes                      b) No

If yes,

Age	Cause of death

2.12 Does any family member have married in past one year?(Please tick )

- a) Yes                      b) No

If yes, at what age he/she get marriage .....

2.13 How often you or any family member listen radio or what TV?

- a) Every day  
 b) A few times a week  
 c) Once a week  
 d) Less than once a week\  
 e) Never

3 family access on information technology		
3.1 How many electrical instruments do you posses before and after electrification (multiple choice yes or no )		
Instruments	Before	After
Radio		
T V		
Refrigerator		
Washing machine		
Computer/Laptop		
Battery		
Mobile		



- a) Saw mill      b) Rice mill      c) Poultry Firm
- d) Spice mill      e) Oil Expeller      f) Bakery industry
- g) Furniture industry      h) Other (specify) .....

4.5 Did you find that after the involving on productive work it help to increase your income level?

- a) Yes    b) No    c) To same extent    d) Difficult to say

If yes, how much Rs .....

### 5 Energy and small hydropower

5.1 What was your mind source of energy before hydro project? (please tick )

- a) Fire wood                      b) Kerosene
- c) Bio gas                        d) LP gas
- e) Animal dang                f) From electricity      g) Other(specify).....

If firewood how many firewood required in one month?

..... (Bhari)    (3 Bhari = 1 quintal)

5.2 What was your mind source of energy after hydro project? (Please tick )

- a) Fire wood                      b) Kerosene
- c) Bio gas                        d) LP gas
- e) Animal dang                f) From electricity      g) Other (specify).....

5.3 What is the main source of light? (Please tick )

- a) Kerosene                      b) Electricity
- c) Bio gas                        d) Other (specify).....

If electricity, how many bulbs in your house?

5.4 How units of electricity do you consume in one month?

..... units

5.5 How much money do you spend on this energy		
Sources? Specify total in Rs.  Kerosene  Battery  Candle  Firewood  Electricity		

5.6 did you feel environment after the project?	1. Yes      2. No
5.7 What type of pollution increased?	1. Water pollution  2. Air pollution  3. landslide  4. Dust  5. Deforestation  6. Others
5.8 What is the status of sanitation in the after electricity	1. Improved  2. Worse  3. Same as before
5.9 Is there regularity in the electricity distribution?	1. yes

	2.No
5.10 What advantage of HSP attracted you must	1. Improved health 2. Time saving 3.Easy to work at night 4.Increase in reading habit 5. Effective in agricultural production    6. Other
5.11Are you satisfied with the way SHP working	1. Very Satisfied 2. Satisfied 3Neutral 4.Non-satisfied
5.12 What type of change has been observed	..... .....
5.13 Is there any change occurred in governmental and non-governmental services in VDC after stabilization of the project?	1.Yes 2. No
5.14 What should be done for the sustainability of the project?	From governmental side..... ..... From user side..... ..... From management side..... .....