

CHAPTER - I

INTRODUCTION

1.1 General Background

Nepal is the second richest in the world after Brazil. Nepal has more than 600 large and small rivers. The total length of these large and small rivers is 45,000 km. The perennial nature of Nepalese rivers and the step gradient of the country's topography provide ideal conditions for the development of some of the world's largest hydropower projects in Nepal. The total potential of these rivers is estimated about 83,000 MW and 42,000 MW is technically and economically feasible (Bose, 1997).

The demand of electricity power has increased day by day due to rise in population. Electricity is white energy because it is pollution less. By using the electrical and electronics devices we can completely vanish the dependency on fossil fuel. If we can use the hydro energy aptly then it helps to uplift the living standard of people.

Nepal embarked on hydro energy by generating its first hydropower plant (500 kW) in 1911. But the pace of generating hydro energy is very slow, the second hydropower project Sundarjal (900 kW) in 1935 was generated 24 years later than the first hydro power project, but now its capacity is only 640 kW. The development of hydropower went ahead smoothly in a progressive path. Only 2077 kW power was installed from hydropower at the starting date of economic plan in 1956 AD. Every plan has been prioritizing and implementing the programs about the development of hydropower in Nepal (Koirala, 2011).

The major energy sources of Nepal are forest, organic matters, petroleum products, hydroelectricity and coal. Other alternative energy sources are wind, solar and biogas, which come gradually in practice. Traditional sources of energy such as fire-wood, agriculture residue and animal dung play the

dominant role in Nepal. To generate the large hydro power project is very costly the people of the remote area are dispersed widely so it is very difficult to connect them by national grid, so the concept of small hydro power project comes in practice in 1975 AD to implement small hydro installation in remote areas, particularly at district headquarters, It was unable to fulfill its ambitions plan because of technical, financial and managerial problems and also due to the lack of overall condition and forward planning in this sector. Moreover, the need of energy has been emphasized and programs related to this sector was started to include in every plan. The programs have covered implementation of big, small and middle hydropower.

The government has established a power development fund (PDF) in 1998 to support the private investors. Similarly, domestic commercial banks have been also autonomously investing on hydropower project is priority sector investment. The policy has been encouraged the private investors to install small hydropower projects to meet the growing national demand for energy in the country.

At present the effort of the government and Nepal Electricity Authority (NEA) is not adequate to harness the vast power generation potentiality of the country and meet the growing demand in the short-run. Electricity act 1992 has facilitated wide business opportunities to local and foreign investors for developing hydropower projects. In this regards, the government has already granted permission to independent power producers to develop hydropower project.

1. 2 Statement of the problem

Nepal has agrarian economy due to lack of generation of hydro electricity. Hydro energy is cheapest energy because it is free gift of mother Nature. The development of industry, trade, transportation, communication and tourism

sektor cannot gear up due to lack of excises hydro energy. In short, economic development has not got proper acceleration due to insufficiency of electricity.

Energy plays a key role in sustainable development of socio-economic growth in the county. The role of energy in our socio-economic is important both form the point of domestic use and export. The pace of industrialization was sluggish in the past due to the shortage of energy and it can't be accelerated until the obstacles of the availability of energy are removed. The case is same in agriculture sector for food processing, cottage industries, water mills, lift irrigation, drinking water and so on. The demand of energy is increasing even though per capita consumption is very low in the county. Moreover, the development of electricity is key to the overall development of socio-economic sector. Large majority of peoples are live in darkness although the country is endowed with immense hydropower resources and they are unable to use electric power for their own purposes. A large portion of people still use traditional types of energy. A cost of gird connection and low scattered population density are the basic problem.

In Nepal fuel wood is the main source of energy for heating and cooking purposes and forest remain the single most improtant source for firewood particularly for rural people. Forest account for 78 percent of energy consumption. the pattern of energy consumption is changing along with the economic growth and urbanization. The use of traditional sources of energy such as cow dung and agricultural residues declined from 22 percent to 9 percent while the consumption of energy from the commercial sources such as coal, petroleum products and electricity increased from 4 percent to 12 percent However, the major percentage share is still fuel wood. The rural people still depends on firewood to meet their energy demand for cooking and heating purposes due to lack of alternative sources of energy at affordable prices. firewood is still considered as free gift of nature and people are reluctant to pay for it. As many rural people depend on firewood, its consumption has increased along eith population growth. fuel wood and fodder collection has

adversely affected the growing stock of the natural forests and maturity of plantation forests (Forestry components. bolgspot. com)

The over exploitation of forest resources has caused serious environmental problems. Most of the people still spend on firewood for primary purpose and this pressure is increasing day by day. The imbalance between energy demand and sustainable resource management is already a serious one. On the other hand, commercial sources of energy are not available in the country, Nepal has no known oil, ages or coal deposits. All commercial fossil fuels (Mainly oil and coal) are either imported from India or form international markets routed through India. Fuel imports absorb over one-fourth of Nepal's foreign exchange earnings (en. wikipedia. org/wiki/Nepal).

Various types of risks are involved in the implementatin of hydropower projects, such as commercial, legal, political, natural calamities and so on. since, there is no clear policy on what types of risks would be borne by private sector and what types of risks would be borne by government sector, it is getting deffucult to reach an agreement with the private sector.

Collection of fund to establish the hydro power project is one of the hurdles in hydropower development in Nepal. Nepal has not able to export hydropower to neighboring merket i. e. India, Bangladesh and Tibet Autonomous Region of china due to high cost of electricity. This may be attributed to difficult topography of the country, lack of infrastructures, costly consultancy fees, high cost of foreign equipment and construction materials etc.

The sources of water are insufficient during the dry season to generate electricity in full capacity, because the pace of rivers sharply decreases during dry season. And there is another major problem is reparation, most of the generators and trubines are out of their works it creates the problem of load shedding in the country.

The construction of large reservoir and hung dams which results into rapid depletion of the forest resources, occurrence of landslide, soil erosion, rock fall and badly affect the eco system because it distorts the natural habit and bahitat of aqua animals and surrounding people. similarly, it has its impact of landform, land use and historical and cultural sites, Due to the drastic cultural and physical envirnment. The diturb in natural ecosystem lead to impact on food chain and food habits, further consequences to the extinct of various endangered species. In this perspective, the pioneer has been made to finding the solution of the problems like socio-economic status of project affected families and major impact of the project on the surrounding. systematic studies of these problems have been done on the basis of field observation, survey and attempt has been made to analyze the socio-economic impact of Modikhola hydropower project.

1.3 Objectives of the Study

The overall objectives of the study are to accessing the major impact of the Modikhola hydropower project, on socio-economic condition of project affected households.

The specific objectives are given below:

-) To analyze the importance of hydropower to develop the cottage industries.
-) To assess the socio-economic impact of Modikhola hydropower project in the adjoining area.

1. 4 Significance of the Study

The energy is vital for drive the country on the prosperous way of development. The utilization of energy especially is centered in urban and more of the rural areas have been by passed by existence energy development scheme in Nepal. Generally, sourecs of evergy are broadly divided in to two parts traditional and commercial. Almost all the shuseholds are found to have

consumed traditional sources of energy especially firewood for domestic use and other necessary activities of human life. electricity can raise the living standard and up lift the health condition of the people because dependency of people on fuel wood curtails which help to reduce indoor pollution due to which problems of lungs and eye infectin drastically reduced. people are more concern with information and tecnology due to the electric power because people have modern forms of electronic and electrical devices like TV, Computer, and internet etc. which helps to aware them to their daily lives.

Significance of the study is :

-) To study the Modikhola hydro power project, it helps to develop infrastructure.
-) By studing the Modikhola hydro power project, it helps to develop skill of human resources.
-) By studying the Modikhola hydropower project, it helps to development of business sector, co-operatives, road accesses, health care centre, employment opportunities, school, banks etc.
-) By studying Modikhola hydro power project, it helps to increase local market development and tourism activities.
-) By studying Modikhola hydro power project, it helps to change in land holding siz, rising cost of land, housing construction etc.

1. 5 Limitations of the Study

This study is a case study of Modikhola hydropower project; most of the information required for this study was based on the data collected from questionnaire and field observation. The secondary information was collected from Nepal Electricity authority (NEA), Nepal Electricity Development Board (NEDB), and ministry Of Energy (MOE). All the secondary information which

was used in this study may not be far relevant because of the variation in purpose, objectives and time.

The research work has depend on deupur village development committee of parbat District which may not be reliable to other part of the country. Limited budget, time and small sample size are also the serious limitations of the study.

CHAPTER - II

LITERATURE REVIEW

Research has been conducted on socio- economic impacts of hydropower project in Nepal as well as in abroad. Generally, the studies on medium and large scale hydropower project have been conducted to identify various types of impacts created by the development of hydropower project. Many books, articles, reports on hydropower, previous research works, publications and writing on journals, newspaper and international concept on hydropower which are related to hydropower are reviewed in this thesis. Those literatures which are closely related to this research have been reviewed as follows.

2. 1 Nepalese Context

Awasti (2010), "Socio-economic impact of chameliya hydropower project in the adjoining area". In his study, he has mentioned the socio-economic impacts of chameliya hydropower project 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 socio and recreational activities like increase in educational standard, purchase of Radios, Television, Tape recorder etc.

This study is a descriptive one based up on qualitative data. It has used primary as well as secondary data. This primary data has been generated form field survey, interview, observation and questionnaire.

Pandey (2009), "Role of electricity for economic Development of Nepal" Explains electricity is the most important thing for making country industrialization and in modern era-industrialization of any country plays an important role in economic development. Exploitation and utilization of energy sources have contributed so much to the development of industry , agriculture,

transport etc. According to him per capita energy consumption is the basic factor not only for the comparison of living standard of the people of Nepal but also for the measurement of the role of economic growth of the country.

Joshi (2011), in his thesis "Socio-economic impact of surma Devi small Hydropower project: a case study of Bajhang District" has mentioned that energy is important for economic development, The pace of economic development of productive sector of an economy depends on development of the energy sector. In the hilly and mountainous area, almost all the households are found to have consumed traditional sources of energy for cooking , heating, lighting and other necessary activities. Traditional energy sources can not be sustainable to fulfill energy requirement. From the present analysis it has been observed that most of the people depend on forest for energy sources and livestock. As a result, the people depend on forest for energy sources and livestock. As a result, the deforestation has brought about ecological and environmental hazards along with shortage of fuel wood, soil erosion, deterioration of the fertility of soil etc. Deforestation leads to the deterioration of water sources and hampers both electricity generation and drinking water. Hydropower occupies a very eminent place in the energy sector of Nepal, The utilization of energy is concentrated on urban areas and most of the rural areas have been by-Passed-by this power development, The hydropower project has brought about changes in socio-economic, cultural and other aspects of the people living in the project located area and it's surroundings. To find socio-economic impact and to introduce the total effect of the project at the study area is main objective as well as quantitative method is used the study find the every kinds of socio-economic and environmental effect in the study area as well as surrounding area.

Ghimire (2007), "Small Hydropower Development Opportunities and Present status in Nepal" Has mentioned that Nepal has made considerable progress in the field of small scale water resources projects in terms of capacity bulding project management and legal instrumnet, particulary in the last devade.

Considerable efforts have been made by the government to attract the private sector in the hydropower development. Appropriate environmental act, rules and guide lines are also in place for the selection, planning design, implementation and operation of infrastructure project. To meet the national energy objectives, small scale hydropower plants are effective for the electrification of remote isolated areas. These plants can be interconnected and make local grid systems, later the local grid system can be hooked to the national grid system. Thus, reliability and stability of power grid can be achieved due to unique operating characteristics of hydropower.

WECS (1995), "Socio-economic issues in energy development". Analyzed that energy is the basic necessary for survival. It is necessary for development activities a reasonable standard of living and it is also a critical factor for economic development and employment. Shorage of biomass fuels has forced urban huseholds and indurtries to switch from biomass fuel to improted fossils fuels and other commercial from of energy. Deforestation and desertification are threatening or traditional energy supplies and agro-base rural economy. These shortage of biomass fuel in rural sector have energy scare and needed to promote rapid economic growth to meet the basic need of rural ramilies is also palgued by the lack and other resources example:farmland, technology and capital for investment.

Kandel (2006), " Status of Hydropower in Nepal's Economy" Has ecamined the importance of electricity it is known as white gold of country, renewable, multi purposeful, no raw materials cost and from environmental prospective too. Hydropower development in Nepal has been Facing different problems such as procedural complications, political instability, insufficient infrastructure; most of the rivers are run off type, unnecessary condition imposed by multilateral and bilateral countries while providing finachial assistance too.

The hydropower potential of Nepal is huge and the sustainable hydropower development becomes the key to make Nepal's economic growth scenario

brighter, gaining deep inroads into the national goal and priority of poverty reduction. Water resource is the Nepal's greatest asset but unfortunately very insignificant portion has been harnessed to this data. He says that there is unequal distribution of electricity in different development regions.

Adhikari (2006), "Hydropower Development in Nepal". Focus on the exploitation of hydropower for the increasing demand of energy. He has analyzed the historical development for the increasing demand of energy. He has analyzed the historical development of hydropower sector of Nepal. He also recommends that the acts and regulation should be made to support the environment and development together.

Another report was published in May, 1995 by HMG of water resources, water and energy commission secretariat on socio-economic issue in energy development that energy is basic necessary for survival it is necessary for development activities a reasonable standard of living and it is also a critical factor for economic development and employment shortage of biomass fuels to imported fossil fuels and other commercial form of energy. Deforestation and desertification are threatening to traditional energy supplies and agro-based rural economy. These shortages of biomass fuel in rural sector have energy source are needed to promote rapid growth of the rural economic growth to meet the basic needs of rural families it also plagued by the lack of energy and other resources e. g. farm land, technology and capital for investment. The main features of the energy and other sector is the imbalance between energy resource endowment and its current use. There is an excessive dependence of forest to meet energy needs while hydropower which has vast potential has remained virtually not so utilized. Biomass is not an important energy which is technically limited in hills and mountains even in Tarai. Nepal's hilly and mountain area occupied under development infrastructure makes life hard for house chores and share work in the farm and also fuel collection for energy requirement. This increase work in the farm and also fuel collection for energy requirement. This increase work load for the Women. The reports mainly

concentrated on women who are responsible for reproduction and bring up all the time spent to the next generation and care on a daily basis of all family members. Moreover, they generally work hard but are paid low wages and offer security, low valuation of women's work, legal rights and also non-wages.

Ozaki (2008), "Development of medium-sized storage projects in Nepal"-He has mentioned that the necessity of storage projects in the present NEA system has only one seasonal shortage project, Kulekhani-1 (60MW). After the completion of this project in 1982, a good regulation of electricity prevailed in the INPS meeting the peak demand of the country. Presently, in the NEA system, except Kulekhani-1 is the only storage project, all other hydropower projects are run-of-river type, which means that the capacity and energy availability of the system is constrained by the availability of water in the river. This leads to a situation which has excess in wet months and scarcity in the dry months. As only one seasonal storage project like Kulekhani-1 is existing in the system, it will always face imbalance in the Nepal power system. This means increasing surplus during the rainy season and huge deficit in the dry season.

In order to improve the imbalance situation, an adequate combination of runoff river projects and storage projects has been required, and to achieve this it is obvious that storage projects are urgently needed. In his study he showed the some disadvantages of storage projects as compared to run-of-river projects. Initial investment cost and generation unit cost (Kwh) become high, construction period becomes long, environmental impact (relocation of houses and inundation of land etc) becomes large and technically sediment treatment becomes troublesome. Due to these disadvantages almost all private investors have no interest in or are reluctant to develop storage projects despite urgent necessity.

Further he stresses that projects can only play an important role to cover or improve the current imbalance in the national power sector because thermal power generation can not be expected in Nepal.

Shrestha, in his book "Hydropower in Nepal". He has shown the following findings.

- (1) Major achievements in the economic development of Nepal could be realized through proper harvesting of the rest water resources. However a nearly 100 percent dependency on overseas professionals and a failure to gradually develop our own manpower present realization of this goal.
- (2) The opportunities in the hydropower development do not connote merely approving new projects but also commitment to maintaining and optimizing the efficiency of existing hydropower plants. such opportunities means institutional development but this has been grossly over looked for obvious reasons.
- (3) An alternative storage for the hydropower development in Nepal would be to open door for privatization, where there would be more chance for development of the country.
- (4) To demonstrate the assessment of conditions that has been made throughout the history of development in hydropower in Nepal.
- (5) As the development of hydropower in Nepal has always been dictated by many constraints and conditions. projects are selected by paanning procedure which is deliberately designed to produce a 'no option' situation in decision making.

Pathak 92007), "Power Development in Nepal" He has mentioned that may challenges in the sector of power development on Nepal. Considering the vast range of hydropower project available for development in Nepal, large national and international financial resources are required to develop the nation's hydropowe potential. the challenge therefore lies in arragging finance for the development plans and discovering avenues to reduce the sosti of electricity so that the energy produced may be more affordable to the users and the ation will

be able to export the surplus power. In this respect, the executing agencies responsible for the development of power projects need lots of support from the government in various areas, including the area relating to arrangement of finance for development of projects.

Development is definitely not a one-time activity; it is a continuing process that should address the variation of demand with time. NEA prepares updated forecasts of power and energy demand every year in order to supply the ever-growing demand of power and energy by sustaining the integrated power system, it is necessary that a mix of suitable ROR, PROR and peak load requirements of the system at low costs on a regular basis. In other words, as the integrated system is facing both load and peak load deficit, development of projects to cater for only peak load will not suit the system requirements. Moreover, building transmission linkages across the border will be equally important to flourish development under the concept of bilateral and regional cooperation.

Kayastha (2007), "Micro-Hydropower Technology: alternative sources of energy for rural Nepalese people". In his writings he has presented that micro-hydro technology is matured in Nepal. Most of the components of micro-hydro are supplied by Nepalese industries with the exception of some electrical components. The development and commercialization of micro-hydro technology has already made a significant progress in Nepal. Although the present energy is capable of supporting the efforts towards breaking of the socio-economic stagnation of the remote rural hills.

Micro-hydro technology is one of the viable energy technologies and relies on a renewable, non-polluting and indigenous source; it can be integrated with irrigation and water supply projects. In support of the enhancement of the irrigation and water supply project. In support of the enhancement of the livelihood of

rural people, it is a proven technology so that, micro-hydro development plays a multidimensional role to develop the isolated rural areas of Nepal.

Acharya (1983), in her thesis “Hydropower Development in Nepal and its contribution to Nepalese Economy”. She has mentioned the contribution of hydro electricity to Nepalese economy. It plays significant role by developing various fields such as agriculture, industries, transportation, social services etc. water resources is the Nepal’s greatest asset by unfortunately very significant portion has been harnessed to this date. She says that there is unequal distribution of electricity in different development regions. Nepal is facing many problems with respect to hydropower development. These are lack of capital, skilled manpower, technical, knowledge, sufficient market and economic status of people as well country.

Win Rock International Nepal (2006), has mentioned the role of energy in poverty and its links to people’s living condition in terms of education, health, sustainable environment and women’s empowerment while REDIP and other rural energy services have been in place for almost a decade, the quantitative measurement of their efforts towards the national poverty reduction strategy (PRS) and MDGs have been documented and reviewed in detail. This study is designed to analysis PRS as well as MDG targets. The two primary objectives of this study were to undertake comparative analysis of changes before and after REDIP intervention and analysis the overall approach of program that contributed to MDGs.

This report found out several improvements in REDP Supported communities in some MDGs indicators such as women’s empowerment (MDG3) is found to be directly influenced by REDP’S initiatives, with 48% of the total women interviewed holding higher proportion in various community based organizations. This was also confirmed with positive response from community elders. Recall questions also established the significant role of REDP in achieving greener and sustainable environment (MDG7) and that REDP’s holistic approach plays

a key role in hitting a number of MDCs targets simultaneously. However, this study also suggest that linkages between energy and some development outomes are too comlex, and that a better understanding to these linkages is still needed overall, positive changes in many indicators confirmed the vital role of energy in the development process of the rural communities studied. Considering that REDP is providing energy services in an integrated manner, including skills development, enterprise development, information services, institutional and capacity bulding, fuel supply, technology manufacturing, operations and maintenance etc. with encouraging outputs it can be considered as a best practice model operating so far in Nepal.

Sherstha (1995), in his article "privatization of power sector in Nepal". Has mentioned that efforts of privatization in power development started in united states of America and United kingdom since 1980s. Nepal is in its initial stage of privatization of the power sector after it brought out new and liberal water Resources policy-1992, Hydropower Development policy-1992 and Electricity act 1992. Private sector initiatives and market oriented behavior are expected to improve the power sector and its performance and efficiency. The number of hydropower project installed by private sector is increasing day by day. Rural people cannot afford high electricity tariff unless the government provides subsidies. Significant portion of cash flows out of the country as debt services and dividends that create the problem of deficit balance of payment and less attention towards environmental impacts are major demerits pointed out by sheathe. On the other, power sector creates more employment opportunity, improvement of socio-economic condition of people, promotion of skill, encouragement to the investors, consciousness, control of environmental degradation, deforestation and desertification, increase in government revenue, and assistance to the national economy are some merits of privatization of power sector.

Gurung (2002). Focused his attention to investigate the major socio-economic and physical impact of the project during construction period. Sources of

information were mainly based on field observation and questionnaire, he followed analytical method to analyze the impact, and different bar and charts has been used for analyzing information. He mentioned that during the construction period air quality is highly polluted and the temperature has been increased slightly. The project also affected various species of flora and fauna as well as other aquatic life, It has its impact on individual household as well as whole community. He further mentioned that the pre-existing infrastructure whole community. He further mentioned that the pre-existing infrastructure remain inadequate to meet the demand due to drastic population growth. The existing pitch road was destroyed due to practices of the people in the surrounding areas has been changed consequently due to occupational change as well as influenced by the people from different socio-economic background. Some people migrated to other places and some of them became landless and work as a labor in the project.

He recommended for detail estimation of the impact before the establishment of project and environmentally safer technique and economically profitable procedure. He further stated that the local people must get benefits from the project as well as the compensation should be distributed in time and in an easy process.

2.1.1 Review of Impact Analysis of the Study

The project has its both positive and negative impacts. Rural electrification development of business sector and co-operatives, health care centre, employment opportunities are the major beneficial impacts. Apart from this, the project has its tremendous negative impacts on physical, biological and socio-economic of the surrounding area basically during the construction phases. Increasing population pressure, labor immigration, changing pattern of land use, socio-economic condition and construction of physical infrastructure have gradually deteriorating the rural peaceful environment particularly in around project area. The change in land holding size, livestock and public

grazing area, housing construction, clearance of vegetation and unmanaged spoil disposal have collectively contributed to the degradation of environmental condition for the project area.

Due to the loss of vegetation, extensive deforestation, increase of population around the project area alter the local climate and temperature that caused impact up on the aquatic and terrestrial eco-system. The frequent movement of vehicles, movement of labor to and fro, unmanaged solid waste disposal increase some epidemic and endemic diseases.

As conserving, degradation and development of any one of the natural resources affected the other resources and the local socio-economic life as well, understanding of the linkages between various natural resources system and human use system is extremely important. A balance and integrated view of the importance of all natural resources ([siteresources.worldbank.org/. ./](http://siteresources.worldbank.org/)).

2.1.2 Review of Importance of Hydropower to Develop the Cottage Industries

The cottage and small scale industries have been defined in different countries in different ways. Before proceeding further, it is necessary to understand the expression of small and cottage industry. In the case of cottage industry the process of production will be only through small labor and little or no machinery will be used, whereas in small scale industry machinery will be used. The words small scale industry is itself different in various countries. In Japan these are called “small enterprise”, In India “small industry, others “small business” and some other call them rural or cottage industry . These different expressions also indicate different meanings and scope of small industry in these countries. Industries specified by HMG in as traditional art and culture of the nation, and which mobilize special skill or local raw materials and resources.

Geographically, Nepal is a mountainous country with immense endowment of natural resources. It however, is still a poor country due to the lack their proper exploitation of aailable resources. Every sector of economic development is influenced by electricity. Nepal has extreme potentiality of development of hydropower due to ecormous water resources and favorable topography. The hydropower is the yardstick of the modern development because of its tremendous advangages. The adequate supply of electric power is considered as the basic impetus of each and every country. So, hydropower is ans essential as well as highly valuable asset of the nation. Besides, it is also a basic for socio-economic development . In the highly industrialized countries, electricity has become virtually lifeblood of social and economic structures.

Nepal's economic prospect lies in its water resources, which flow pricelessly from Nepal to India. It is assumed that the present estimated commercial potential of water resources in Nepal, if harnessed properly through bilateral, regional and international cooperation, the benefit would accrue, not only to Nepal but also to the SAARC region as whole.

Every country's development depends on the development of agriculture, trade and commerce, transportation and communication, tourism and social service sectors and industries sectors. More of less in all these sectors electric power is required either for domestic use such as lighting, geating and cooking or for commercial use such as operating machines and equipment or for laboratory use and industrial purpose and so on. so, hydropower plays significant role in the overall development of our nation. Hydropower can play major role to substitute fule wood and help to control environmental degradation.

As a commercial source, petroleum products are imported. It needs a large amount of foreign currencies. Our foreign trade shows that import is greater than export. The demand for energy is increasing day by day along with growing population and development activities within the country. Increase in the volume of imported petroleum prducts within economy is normal in the

absence of its substitutable energies. But the circumstances have made us dependent on development economies. Nepalese economy has been suffering from trade deficit and unfavorable balance of payment. If we become able to replace petroleum products by electricity, only then saving can be invested for development activities. Electricity therefore is an accelerator of economic development. In the Nepalese context, electricity may be an ideal substitute for fuel wood and petroleum products.

Electricity plays a significant role for domestic, industrial, agriculture, tourism, social service, transportation, communication, trade and commerce. It is both essential output as well as input in our practical life. The role of hydropower in industries development has been discussed below. (www.moea.gov.bt/)

2.1.3 Review of Contribution of Hydro Electric Energy in Industrial Sector

Energy consumption is one of the indicators of life standard. Energy plays an important role for the modernization of agriculture, industrial and other sectors. The modern human life is impossible to imagine without energy and other sectors. The modern human life is impossible to imagine without energy, especially that of energy. In industrial sector, the use of electricity is essential for operation equipments.

Energy is heart and soul of industrialization. It is one of the foundations of industrialization. The objective of industrialization cannot be achieved without energy. Not a single machine of the modern world can be operated without energy, through whatever form it may be. Thus the importance of energy is not only in social life of the people. Energy also influences the relationship between different countries significantly in the modern era.

Industrial development of the country can improve the standard of the people. Because people get more employment opportunities as industrial workers, which transfer them purchasing power with wages. Surely, this makes better life of the economy assets wider scope of mobility. These activities show the

real effect on GDP accounting. Therefore, hydro energy is the pre-requisite of the industrial development with respect to modern development.

The economic development of any country depends not only the availability of natural resources but also on the extent of its rationale utilization. Nepalese economy can grow strong by developing all level of industries based on available resources within the country, unfortunately, the important sectors like agriculture, industry, trade and commerce and still in the infant stage of development.

Advanced economies like USA, UK and japan developed with the help of the industrial development. The ecmplary lesson signifies that the development of industriiies pushes up the economy by creating demand, opportunities, expanding market, increasing properly, encouraging the entrepreneur and so on.

Electricity is the prime mover of industrial development. It is an essential element for all scale industries such as small and cottage, medium and heavy scales. Infrastructures are foundation of economic development. Industries and infrastructures are positively related to each other.

(www.eia.gov/totalenergy/data/annual/showtext.cfm?t=ptb1002)

2.2 International Context

Sarfoh, joseph (1990), in his book” Hydropower Development in West Africa :A case study in resource development” states that Africa has the highest potential for hydropower development, it is also behing other regions in developing that potential sarfoh argue that hydropower was not developed to the required levels in west Africa because of the initial high cost of hydropower plants, low domestic power markets and ignorance of hydro resources and future energy needs.

The author's propose remedies a full assessment of present and future energy needs change in fundamental features of the political and economics of various countries expansions of electricity to rural populations and regional cooperation in hydropower development.

The author's observation that "mere availability of resources and the advantages which hydroelectric power offers have not as yet induced any appreciable level of hydroelectricity generation" Concisely illustrates the essence of professor Sarfoh's discussion in this book.

The author examines the energy consumption practice of West Africans and the potential of several energy resource endowments of the sub region. The further states that only the development of hydropower from West Africa's river systems can satisfy those needs. As domestic sources of energy, hydroelectricity will be cheaper and more accessible than foreign oil and less damaging to the environment than the depletion of forests for firewood.

The author implies a relationship between the obstacles to hydropower development and domestic politics and economics while such a relationship might very well exist, the author does not demonstrate it.

Sarfoh is less than convincing in his conclusion that hydropower represents the best alternative sources of energy for West African, especially when one conditions the formidable obstacles that outlines. The net result of the obstacles is a significant reduction in hydropower generated, necessitating the closing of some hydropower plants and the purchase of private generators by industries and individuals West Africa's hydropower projects thus become unreliable, inefficient and very costly sources of energy.

Sati(2004), "Water resource management and policy perspectives" has stated that the involvement of different government complicate the situation for effective natural resource allocation. He suggested that the management and development of water resources would be governed by national perspectives

and it also integrates quantity and quality aspects as well as environmental consideration for water through adequate institutional arrangement. He recommends that the policy must consider the involvement of people in project planing and participatory approach in water resource management.

Yaylor (2011), "Hydropower and sustainable Development. " He mentioned that the current role of hydropower in the global mix. with current trends on a regional basis, followed by an analysis of factors determining further development. specific attention has been given to sustainability assessment in the hydropower sector. A regional analysis of hydropower development, remaining potential and capacity under construction is presented, with some explanations for the differentiations of current activities and levels of deployment. This has been included discussion on synergies with other renewable and perspectives on financial structuring and market incentives.

Further he stressed that the questions of sustainability, its definition within particular contexts and its assessment have been challenges for many human activities:hydropower is curtaining no exception for more than a decade, work has been conducted to define good practice and establish an assessment methodology that in globally applicable to hydropower.

Anderson (2006), in his paper" Norwegian Hydropower and New focuses on small Hydropower" states that Norway is the biggest hydropower producer in Europe, and hydropower industry has traditional over a 100 year long time. In this time Norway has reached an installed output in our hydropower stations of today 27, 470 Mw. Norway has 857 hydropower stations over the whole country to produce hydroelectric power. He further states that in Norway had the peak time in their hydropower development from 1970 to 1985. IN these 15 years. Norway increased the installed output of 10. 730MW after 1990, it has had only minor hydroelectricity of other renewable source developed. Some of the major findings in the paper are as follows:

- (1) Norway is able to produce 99 percent of total electricity from hydropower plants. Wind, solar, thermo play an important role in the total electricity supply for industry and consumers.
- (2) Norway uses over 23, 000 KHz per inhabitant, which is 35 percent more than Canada and over 50 times consumption per inhabitant in India.
- (3) The biggest hydropower station in Norway located in Kviteseid, With a capacity of 1240 MW.

His recommendations indicate that SHP is the only alternative to achieve further development of hydropower plants in Norway and the electricity board and private investors are looking for the streams in hilly sides of western part Norway and the lake system as well for a plan of SHP.

The power sector "Master Plan, JICA" (1974:35) states that the power market in India is large and growing at an annual rate of more than 10 percent, which may be mainly consumed by northern and eastern regional of India alone. As the report further states that Nepal at a competitive cost compared to India, Nepal will have access to huge Indian market along the border areas. It cites the example of Bhutan which has become richer than Nepal by selling hydroelectricity to India from "Chukha" hydropower project.

Ramanathan, K. et al. (2007), in his book "Hydropower development in India: A sector assessment" states that Indian's endowed with rich hydropower potential: It ranks fifth in the world in terms of usable potential . However, less than 25 percent has been developed or taken up for development. Thus hydropower is one of the potential sources of meeting the growing energy needs of the country. The installed generating capacity in Indian (in utilities)as of 31 march 2006 was nearly 0. 125 million MW. This included thermal (coal) gas and liquid fuel)hydro-nuclear, and renewable based generation. Hydropower constituted about 32, 325 MW. The demand for power has been growing at the rate of 5. 74 percent in recent years. during 2005-2006 the

demand were 632 BU in terms of energy and 93210 MW in terms of peak power requirements. The country is experiencing power and 93210 MW in terms of peak power requirements. The country is experiencing power shortages of varying degree in different parts of the country. The shortages during 2005-2006 were 8.4 percent. per-capita consumption of electricity is relatively low, of the order of 600 Kilowatt-hours (kwh).

He has mentioned some findings in his book Indian are endowed with rich hydropower potential: it ranks fifth in the world in terms of usable potential. This is distributed across six major river systems (49 basins) namely, the Indus, Brahmaputra, Ganga, the central Indian River system, and the east and west flowing river systems of south India. The Indus, Brahmaputra and Ganga together account for the country's vast hydropower potential has been harnessed. The share of hydropower in the total installed capacity has also decreased over the years. from over 50 percent in 1960-61 to nearly 26 percent now. preparation of detailed projects reports (DPRs) for hydropower projects takes relatively longer period than for thermal projects because reliable hydrological, geological, seismological and environmental studies have to be carried out for a longer period. In addition to this, these projects are comparatively capital intensive. Development of small hydropower projects suffered due to inaccessibility of the site, lack of power transmission infrastructures, investigation and construction difficulties, land acquisition and financing difficulties, inadequacies in institutional support and in some cases law and order problems.

Based on the above findings the recommendations given by the book are: India has an assessed hydropower potential to the tune of 84,000 MW at 60 percent load factor, out of this only about 20 percent has been developed so far considering the large untapped potential and the intrinsic characteristics of hydropower is promotion of the country's energy security and flexibility in system operation, the government is giving a thrust to accelerate hydropower development. Further he recommends that India has been cooperating with Bhutan and Nepal in hydropower development for over a decade. There are

prospects of further enhancement for the benefit of all the countries and in the larger interest of energy security of the region some prospects of hydropower cooperation with Myanmar are also indicated.

Teli (2002), "Environmental Degradation and Resource Utilization". In his environmental study of Nayer River whose pour water to the river Ganga from the left bank in eastern India, Deals with environmental degradation, biotic pressure, availability and utilization status of resource. His study states that the mismanagement of environment lead to several environmental problems at various stages. The environmental status reflects our development and environment and goes to energy hand, and has to control the environmental hazards and damages like pollution, soil erosion, desertification, deforestation, flood and other ecological imbalances. He further stated that development for moral and ethical foundation to provide balanced economy and environment. Due to adoption of modern means of science and technology, man in modifying the environment according to his own need and requirements. With the results the ecological system has mostly been Jeopardized the existence of life has been put in to danger.

Bose (1997), made a study on "The Tehri dam project and issues of population, Development and Environment" He has mentioned that the construction of such a big dam in mountain leads to great controversial issue. The constructions of such large dam in the mountain environment and in seismic zones create a great sensitive issue for further disaster and hazards, for example Tehri Dam Project in uttarparadesh. He further stressed that: development. In a democracy, the development process must be participatory in nature. He suggested that in the name of science and technology, development should not become culturally incentive and there should be detailed planning for disaster management, natural disasters as well as man-made is necessary.

Khan (1998) in his article "Power sector Development in Pakistan and Economic policy Issues". States that provision of electricity is a precondition

for the advancement of other services to accelerate economic development of the total consumption, households is 41 percent, agriculture 15 percent industry 17 percent: others 12 percent includes railway traction.

Then further states that parkistan has made a great stride to build a self-sustained and viable power system. the overall financial constraint in pakistan and consequently, inadequate availability of funds for new power generation facilities etc. Was the major constraints.

The some major findings of this article are as follows:

-) It is 13228 MW in 1998, hydro 4825MW: therman 8403 MW which includes conventional steam and combined cycle power plants and nuclear 137MW owner pakistan atomic energy commission. The economically exploitable hydroelectric potential in pakistan is about 20000MW. As of 1998, 4825 MW or 24 percent stands developed.
-) It will be pertinent to states that planning of hydroelectric stations require very detail techno-geological, hydrological, economic and financial feasibility studies involving a long time and also money coupled with expertise, not wholly, available within the country.

His recommendation indicates that the electrification of villages manifests transformation of the rural economy in checking the influx of rural workforce in which of work to the already populous cities and towns where the essential services suplied by the utilities are already overcapacities.

2.3 Conclusion

The review to available literatures at the Nepalese context as well as the international context shows that studies about the socio-economic impact of hydropower project in the mountainous and backward rural regions is stillfacing problems. Therefore, this study aims to examine the soci-economic economic potentialities in the project area.

CHAPTER - III

METHODOLOGY

3. 1 Research Design

This study is mainly based on qualitative and quantitative data. This study is exploratory as well as descriptive research design. It tries to explore and investigate the socio-economic status of the project affected families and households. The project site is located in Dimuwa VDC of Parbat District: it is 42 km far from the Pokhara, Kaski

3. 2 Nature and Sources of Data

The required data and information for this study are both qualitative as well as quantitative in nature. They have been collected from primary and secondary sources. The primary sources of data in the field survey, structured questionnaire, interviews, group discussion and observation which has been conducted by the researcher, whereas many published and unpublished materials provided are the sources of secondary data.

3. 3 Selection of Study Area

In this research work, various types of variables are identified such as: income, employment, expenditure on agriculture before and after the generating electricity, education i. e. study hours before and after the project, health, sources of energy, increase in economic activities and women's participation ratio to use the electricity as well as economic activities etc. in order to measure the socio-economic impact.

3. 4 Sample Size and Sampling Procedure

The total 600 households in Deupur VDC are affected by the Modikhola hydropower project. Out of 600 households, 120 households have been picked up for the sample size using simple Random Sampling method to fulfill the

purpose of the study. Initially, out of 9 wards 2 are selected by lottery method, all the households are assigned serial numbers, then random no table is used to select the household.

3. 5 Method of Data Collection

The required primary data and information has been gathered through household questionnaire, interviews, group discussion, field observation and official visit the situation of income pattern, employment condition, educational status, health condition, economic activities and women's activeness were collected through the structure questionnaire. The secondary data has been collected from different sources of governmental and non-governmental organizations such as Ministry of Water Resources (MOWR), Ministry of Finance (MOF), Water Energy Consumption Secretariat (WECS), National Planning Commission (NPC), Central Department of Statistics (CBS), Nepal Electricity Authority (NEA), Department of Electricity Authority (DOED), Power Development Fund (PDF), Centre for Economic Development and Administration (CEDA), Alternative Energy Promotion Centre (APEC), Office of Modikhola Hydropower Project, office of Village Development Committee, related bulletins, journals, published reports, books and officials.

3. 6 Methods of Data Analysis and Presentation

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 from structure questionnaire method and analyzed by using software SPSS programme. Primary as well as secondary data have been presented in suitable tables, pie charts, graphs and simple bar diagrams have been used for comparative study of hydro electricity before and after the implementation and to know the impact analysis of hydropower project we use different variables like social, economic, environmental etc. Of hydro power project. The information gathered from field survey has been displayed in diagram and tabular format.

CHAPTER - IV

SOCIO-ECONOMIC STRUCTURE OF PROJECT AFFECTED FAMILY

4.1 Introduction

Modikhola hydropower project lies in parbat District one of the hilly district of Dhaulagiri Zone in Western development region. The district covers the total area of 494 km². Its total population has 1, 57, 826 in 2001. Geographically this district situated in low land "seti-beni" to upper land "jaljala ko dhuri" It is situated between 27 58-28 39' north latitude and 83 34-83 59' east longitudes. Altitude ranges between 1762m-8091m. The study area (Modikhola catchment area) is located in 28 14'30"-28 18'N latitude and 83 42'30"E and 80046'E longitude. It occupies 1996 ha. Area. The boundary of the study area limits up to the kaski district and chitre VDC to the east, the Deurali, Bajung and Durlung DVCs to the west. similarly, Bhakhatangle VDCs to the south. The much affected villages by the Modikhola hydropower project are Dimuwa, Tilahar at tilahar VDC and Rumti, Gauda Bagar, Tapu, Patichaur of the Deupur VDC.

The partly fulfillment of the increasing electric demand of the western development region of Nepal , which is very important in tourism development industries promotion and agriculture development more electricity in the national grid had to be added.

The Modikhola hydropower project is a medium type of power plant. Which is one of the largest power project of the Dhaulagiri Zone? NEA's own effort and resources have collected the essential fund. The feasibility study of this project was done in August 1995 by Hyundai Engineering Company, under the technical co-operation of the Government of Korea. It's run off river type power plant the project was started in June 1996 and it was completed in 2000 AD.

The generation from this power station has contributed 1. 83% of the total energy in INPS.

4. 2 Demographic Characteristics

4. 2. 1 Population Distribution of the Study Area by Sex and Caste

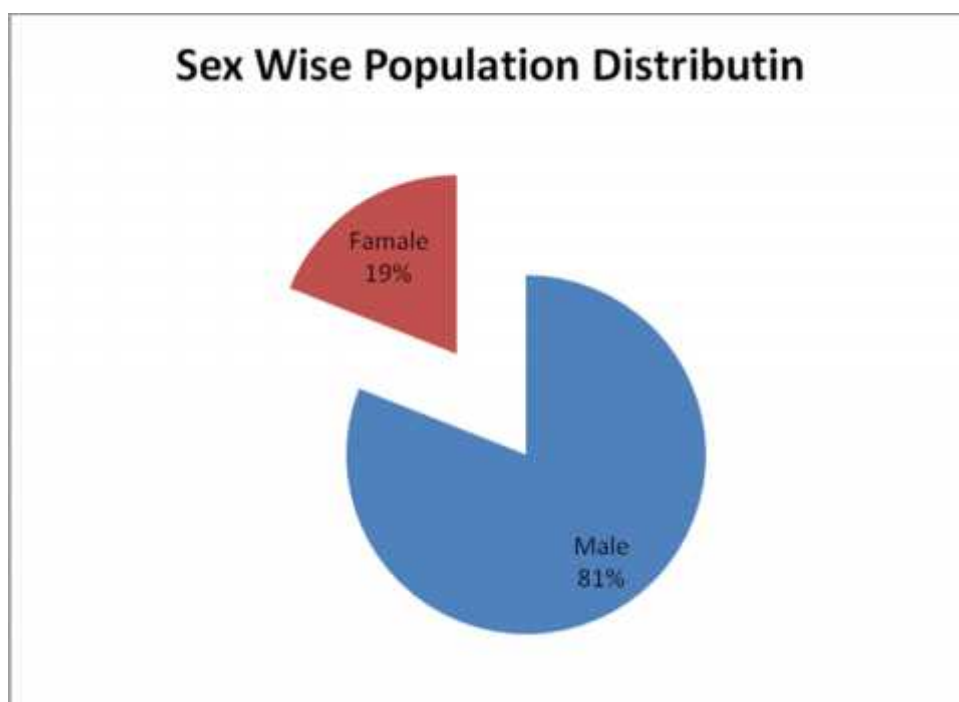
The total 600 household of Deupur VDC, 120 households are picked up from the two wards 05 and 09 of Deupur VDC of parbat District. Out of the total 120 households the share of males are 80. 8 percent and females are 19. 2 percent. Basically, in the study area four caste groups are found which are Bramin, Chhetri, Boaisya and sudra . out of the total caste group Brahmin households are in the highest while other caste groups have the least number of huseholds. out of the total households number of brahmin, Chhetri, Boaisya and Sudra are 105, 6, 1 and 7 respectively, The total number of male and female of the study area have been presented in the following table.

Table 4.1: Sex Wise Population Distribution

S. N	Sex	No. of people	percent
1	Male	97	80. 8
2	Female	23	19. 2
	Total	120	100. 00

Source: field survey, feb. 2014

Figure: 4. 1



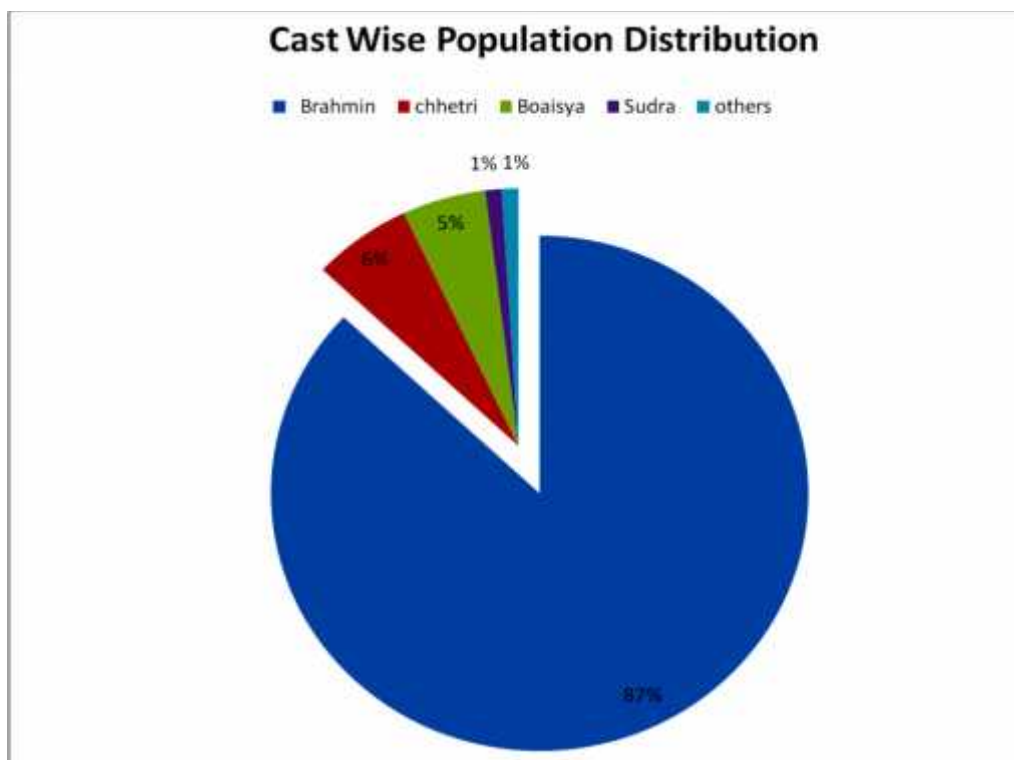
The given table and pie chart presents that, out of 120 households the proportion of male respondents are highest it covers 80. 8 percent and female respondents are lowest which covered 19. 2 percent. it shows that female is less head of households than males.

Table 4.2: Caste Wise Population Distribution of Study Area

S. N	Caste	No. of people	percent
1.	Brahmin	105	87. 5
2.	Chhetri	6	5. 0
3.	Boaisya	1	0. 8
4.	Sudra	7	5. 8
5.	others	1	0. 8
Total		120	100. 00

Source: Field Survey, feb 2014

Figure:4. 2



The population distribution of study area by caste group is found uneven. There are main four caste groups among them Brahmin is the highest and other presented caste group is the lowest. four caste group Barhmin, Chhetri, Boaisya and sudra covered 87. 5, 5. 0, 0. 8 and 5. 8 respectively.

4. 2. 2 Population Distributions by Age Group

Age group of population of the study area differs from villages. The economically active age group(15-59) dominates largest percentage 82. 5 and old aged group 60 and above consists 17. 5 percentages.

Table 4.3: Age Wise Population Distribution of the Study Area

Age	No. of people Percent	
15-19	1	0.8
20-24	10	8.3
25-29	6	5.0
30-34	13	10.8
35-39	23	19.2
40-44	16	13.3
45-49	15	12.5
50-54	7	5.8
55-59	8	6.7
60-64	12	10.0
65-69	3	2.5
70-74	2	1.7
75 and above	4	3.3
Total	120	100

Source: Field Survey, feb. 2014

4. 2. 3. Religious Characteristics in Study Area

Hinduism is the only one religion in the study area. Though it is the homogeneous society from the religious aspect but there are some specialties of feast and festivals regarding own caste group. Generally, people celebrate Dashain, Tihar, Tij (haritalika), Chaita Dashain and so on.....

4. 2. 4 Educational Status of people in Study Area

Literacy is one of the most significant indicators to measure people's living standard. Out of the total population 15.8 percent people are illiterate in the study area. In case of caste group in the study area, literacy rate is different among the different caste. Brahmin literacy rate is higher than other caste

groups. It is found that literacy rate of male is higher than female in every households.

Table 4. 4 Educational Status of the Study Area

S. N	Status	No. of People	Percent
1.	illiterate	19	15. 8
2.	primary	1	0. 8
3.	lower secondary	5	4. 2
4.	S. L. C	33	27. 2
5.	Higher Secondary	25	20. 8
6.	Bachelor	14	11. 7
7.	Masters	2	1. 7
8.	Literate but no schooling	21	17. 5
Total		120	100.00

Source: Field Survey, feb. 2014

The above table shows that, people who get school leaving certificate has the highest 27. 5 percent and primary level has the lowest 0. 8 percent. Similarly, higher secondary level has 20. 8 percent and bachelor and master level has 11. 7 percent population are illiterate and 17. 5 percent people are literate but they were not attend the school.

The literacy rate of male is higher than female in the whole project affected families. There is only on primary school in the study area: there is two boardading shools and onle college near project site whice is lovated in Tilahar VDC. Most of female is found higher than male in lower secondary level in Brahmin and chhetri community of project affected families. Most of the educated male and few famale are involves in teaching profession. There is positive effect on electricity than on petroleum products. In the Same way, their study hour at night also increased due to the cause of electricity so, there is positive impact on literacy status.

4. 2. 5 Housing Condition Before and After the Project

All people were living in house made by mud and stone as well as stone and tin (zinc) roofs (kachchi) and only 18. 3 percent houses are made by cement before starting the project. After the project the ratio of cement made house are increased.

Table4. 5 Housing Condition of the Sampled Households Before and After the Project

S. N	Types of house	Before Project	After Project
1.	Kachchi (stone-mud)	98(81. 7%)	70 (58. 3%)
2.	Pakki (cement)	22(18. 3%)	50 (41. 7%)
	Total 1	20 (100%)	120(100%)

Source: Field Survey, feb 2014

The given table shows that the condition of houses before and after the project. Before starting the generating electricity stone mud(kachchi) house are masimum 81. 7 percent and packi (cement) made house are minimum 18. 3 percent. But after generating perobject this ratio gradully declined from 81. 7 percent to 58. 3 percent on the other hand, cement made house is increased form 18. 3 percent to 41. 7 percent. Most of people involve in any kind of their own business and at the period of construction phase almost people get job opportunities which helps to uplift their living standard which is shown by the housing condition, this shows that there is positive impact on housing condition.

4. 2. 6 Occupational Compositions

The occupation of the people of study area is divided in to two sector i. e. agriculture sector and non-agriculture sector. On-agriculture sector includes business, service, labour and foreign employment

Table 4.6: Occupational Compositions of Affected Families

S. N	Sector	Before Project	After Project
1.	Agriculture	96(80.0%)	72(61.0%)
2.	Service	7(5.8%)	8(6.8%)
3.	Business	17 (14.2%)	31(26.3%)
4.	Foreign job	0	7(5.9%)
5.	laboring	0	0
Total		120 (100%)	120 (100%)

Source: Field survey, Feb. 2014

This table shows that agriculture is the main occupation of affected households which occupies 80.0 percent before the project, but later it was decreased to 61.0 percent, similarly, business is the occupation of affected households which occupies 14.2 percent as a main before the project and it was climbed to 26.3 percent after the project. On the other hand, other sectors like service, foreign job and laboring occupies 5.8 percent and no one engaged on foreign job and laboring before the project. But after the project this was increased 6.8 percent and 5.9 percent respectively as a main occupation. Due to the percent and 5.9 percent respectively as a main occupation. Due to the electricity, attraction of people on business sector is daftly increased because of the low productivity at the agriculture sector. More people have cahnce to get job due to the growing number of business firms which seems that there is positive impact of hydro electricity perject on the occupation of people.

4. 2. 7 Ownership of Land

Table 4.7: Land Holding Pattern of Sampled Households

Ropanies Owned	No. of Households	Percent
0-10	51	42. 5
10-20	18	15. 0
20-30	37	30. 8
30-40	11	9. 2
40-50	3	2. 5
Total	120	100. 0

Source: Field Survey, feb. 2014

In hills and mountain land in measured in terms of ropani. Out of 120 households observed, 42. 5 percent have land between 0-10 ropani, 15. 0 percent have between 10-20 ropani and remaining 30. 8 percent have 20-30 ropani, 9. 2 percent have 30-40 ropani and remaining 2. 5 percent have between 40-50 ropani of land.

4. 2. 8 Use of Fuel Wood

Table 4.8: Fuel Wood Dependency in the Study Area

S. N	Sources	Before Project		After Project	
		No. of HH	Percent	No. of HH	Percent
1.	Firewood	120	100. 00	17	14. 2
2.	Gobar gas	19	15. 8	1	0. 8
3.	Electricity	15	12. 5	120	100. 00

Source: Field survey, feb. 2014

The Given table shows that, out of 120 households surveyed 100 percent households are found to be dependent on forest wood for cooking food and heating purpose before the project. Due to the pollution less energy and easier to work with electrical devices, attraction of people on electricity is sky up so, after the project this dependency ratio was decreased to only 14.2 percent. Similarly, Gobar gas and electricity users are 15.8 percent and 12.5 percent

respectively before the project. When electricity is generated then go bar gas users remain only one house and electricity users covered overall 100 percent surprisingly.

4. 2. 9 Source of Income

Table: 4. 9 sources of Income of the Sampled Households Before and After the Project

Sources	Before the Project		After the Project	
	No of HH	Mean (RS)	No of HH	Mean (Rs)
Food grain	82	1847. 56	55	2430. 00
Fruits	62	1967. 74	60	3433. 33
Livestock	64	1226. 56	60	1283. 33
Vegetables	82	2953. 66	77	3646. 75
Service	33	14877. 79	82	25780. 49
Business	27	1257. 07	49	22938. 78
Rent	11	3090. 91	40	3175. 00
Pension	14	7607. 14	18	14777. 78
Contractor	0	0	0	0
Labor	12	9416. 67	12	12250. 00

Source: field survey, feb. 2014

Form the above table, the sources of income in divided into two parts: agricultural source and non-agricultural source. Agricultural sources include food grain, fruits, livestock and vegetables. Similarly, non-agricultural sources include service, business, rent, pension, contractor and labor. Before the hydro power project agricultural source is the main income generating source in which vegetable is the most income generating source and least is livestock. Similarly, the most income generating source on non-agriculture sector was service and least from rent.

Similarly, this table depicts that after the construction of hydro power project a large number of households depend upon service for their livelihood while

there are also a few who depend upon labor for their living. It also seen that non-agricultural income is higher than agricultural income after the project. Before the project, there were not any opportunities of job without agriculture, very few people were engage in service. So that, the agro-income was higher than non-agro income. But after the project, there in created enough job opportunities by establishing the cottage and other types of industries and widening the service sectors. So the people referred to transfer form the agro sector to the service and industrial sector due to the lubricate income of these sector.

4. 2. 10 Expenditure Patterns of Households

Table: 4. 10 Expenditure Patterns of Sample Households Before and After the Project

Expenditure on	Before Project		After Project	
	No. of HH	Mean	No. of HH	Mean
Agriculture	102	15960. 78	96	19625. 00
Food stuff	120	28126. 05	120	55125. 00
Animal foder	107	13600. 00	108	15361. 11
Edu/health/social	120	43075. 00	120	95641. 67
Miscellaneous	120	34764. 71	118	71550. 85
Interst paid	15	21933. 33		

Source: Field Survey, feb. 2014

From the above table, before implementation of the project most of the people spent their income on education, health and social at the higher proportion and they pent lower proportion on animal fodder. They spent moderately on the other sector like agriculture, food stuff, interest paid and miscellaneous.

After implementation of the project, there is drastic change of expenditure pattern of the sampled households. Higher protion of their income spent on

education, health and social and they spent lower portion on animal fodder. similarly, people spent proportionately on other sector like agriculture, food stuff and miscellaneous. The expenditure pattern is highly increased after generating the project. Before the project implementation, almost all people was limited within the local area. Similarly, when their income increases after the project naturally they wanted to spend more income in various purposes like travelling purchasing luxurious goods and so on.

4. 2. 11Ownership of Modern Durable Items of Households

Table: 4. 11 Ownershiop of Modern Durable Items of Affected Households Before and After the Project

Name of Items	Before the Project		After the Project	
	No. of HH	Percent	NO. of HH	Percent
Radio	120	100.00	114	95.0
Television	0	0	111	92.5
Torches	98	81.7	118	98.5
Others	1	0.8	40	33.3

Source: Field survey, Feb 2014

After the implementation of the project, the access of the people on the modern electrical and electronics devices highly. Before the project the radio is only one of the sources of information and entertainment but after the project radio, television, internet, computers are the sources of information and entertainment Number of modern technologies has increased highly after implementation of the project.

4. 2. 12 Time Spending on Fuel Collection

Most of the females collect the fuel wood instead of male in the study area. Before the project started, people spend lots of time for fuel wood collection up to 8 hours at a day, but normally 42. 5 percent people spend 4 hours at a day in the forest before the project.

Table:4. 12 Time Spend to Collect Firewood Before and After the Project

Before Project			After Project		
Hrs (in a day)	No of HH	Percent	Hrs (in a month)	No of HH	Percent
0	6	5	0	6	5
1	4	3. 3	0-5	1	0. 8
2	11	9. 2	6-10	9	7. 5
3	30	25. 0	11-15	33	27. 5
4	51	42. 5	16-20	45	37. 5
5	12	10. 0	21-25	6	5. 0
6	5	4. 2	26-30	3	2. 5
8	1	0. 8	Not now	17	14. 2
Total	120	100. 00	Total	120	100. 00

Source: Field Survey, feb. 2014

The given table shows that, the time spend to collect firewood before the project launched, out of 120 households only 114 households use firewood from the forest and highest 51 households spend 4 hours to collect fuel wood at a day before the project launched. There is fluctuation between the households to spend time in to forest to collect fire wood only 3.3 percent spent 1 hour 9.2 percent spend 2 hour. 25.0 percent 3 hour, 42.5 percent 4 hour, 10.0 percent spent 5 hour, 4.2 percent. Similarly, we can observe that there is positive impact on time to spend collection of firewood in the forest after the project launched. Most of the people spend maximum time to collect firewood before

the project but later it was decreased because households use electricity it replaced the needs of firewood. In this table, the highest 37.5 percent people spend 16-20 hours in a month to collect firewood and least 0.8 percent people spend 0-5 hours in a month to collect firewood after the project launched.

4. 2. 13 Use of Electricity

project affected families use electricity on various purposes like; lighting cooking food. Television and computers, industries, business, iron and pumping etc.

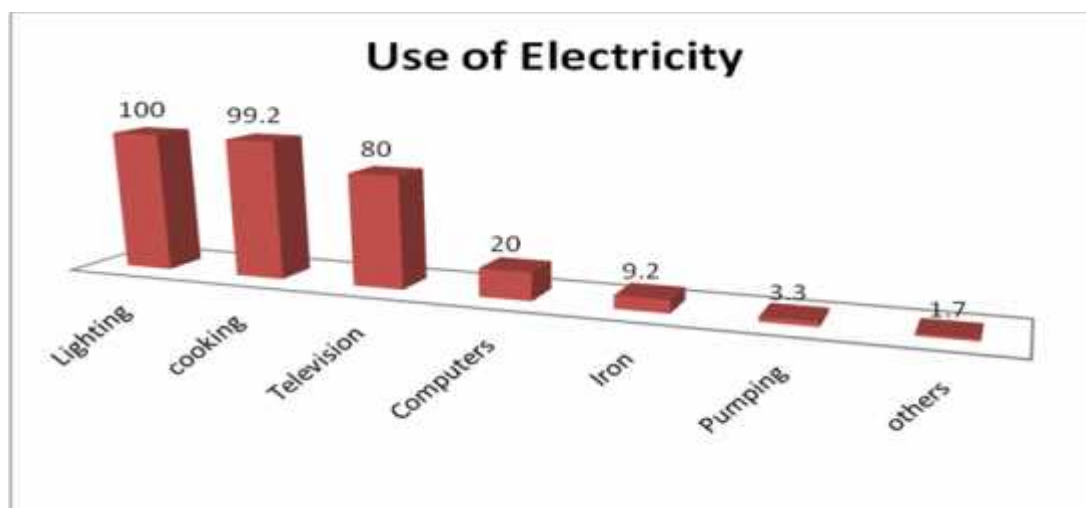
Table 4.13: Use of Electricity by Affected Households

Purpose	No. of HH	Percent
Lighting	120	100.00
Cooking	119	99.2
Television	96	80.0
Computers	24	20.0
Iron	11	9.2
Pumping	4	3.3
Others	2	1.7

Source: Field Survey, feb. 2014

Note: others includes mill, factory

Figure: 4. 3



from the above table and bar diagram 100 percent people use electricity for lighting 99.2 percent use for cooking food, 80.0 percent use for television, 20.0 percent use for computers, 9.2 percent use for iron, 3.3 percent use for pumping and remaining 1.7 percent use for others, others includes industrial purpose and business purpose also. Comparatively, highest portion of the electricity is used in lighting purpose and lower portion of electricity is used in industrial and business purpose. It implies that industrial development is needed to further increase.

4.2.14 Change in Living Standard

The modern facilities mostly affects in human bening. After using such facilities it is expected that there must change in living standard of humna. Actually living standard refers to the higher living. The presenting table shows that aggregate status of living standard after electrical facility.

Table 4.14: Change in Living Standard after Generating Electricity

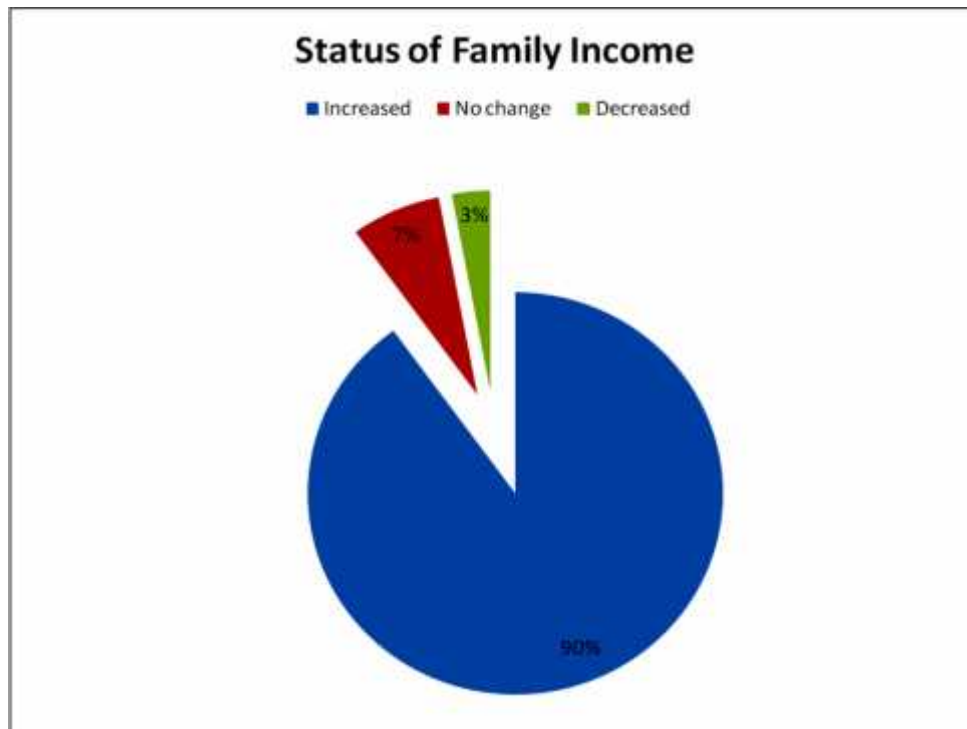
Change	No. Of HH	Percent
Yes	120	100.00
No	0	0.00
Total	120	100.00

It is expected that modern facility like electricity may effect in human life style. so, this table shows the status of living standard of respondents. The question was asked to respondents that have their living standard been changed or not. they replied that when they got the electricity facility they are willing to establish the small and cottage industries and service sector. When the cottage and small industries are increased total production of the local area is also increased and local market also increased. so, why the economic activities are expanded positively and the living standard is positively changed. After the perobject. all respondents i. e. 12 (100%) reported that living standard has been cahnged after the project launchaing.

In addition, it is proved that electricity is one of the most affecting factors of living standard.

4. 2. 15 Status of Family Income

Figure:4. 4



The pie chart shows that, the status of family income of respondent's. Out of total 120 respondents higher proportion i. e. 107 (89. 6%) reported that their family income has increased. Among 120 respondents only 4 (3. 4%) reported their family income dereased after using electricity and remaning 9 (7. 2%) repondents reported their family income is in neutral situation. Among the all respondents reported to increase the income due to involvement in business and service as well as industrial sector but fewer people reported to decrease their real income. When the projcet is implemented some people begin to invest in industries and other industrial business sector this means they directly involved in economic activities their real income as well as monetary income had been increased. On the other hand, same people have engaged in industries as labor

and other services their money income was increased although their real income (savings=0) was not increased.

To sum up, those respondents who have been able to use electricity properly, who have sufficient knowledge and ways about electricity facilities, they have been able to increase family income. Those people who are unknown about electricity still depend on firewood, kerosene and others and they spend more on these so, their family income decreased. Some of the respondents' income neither increased nor decreased. They are living in a neutral position after electricity.

4.2.16 Status of Forest

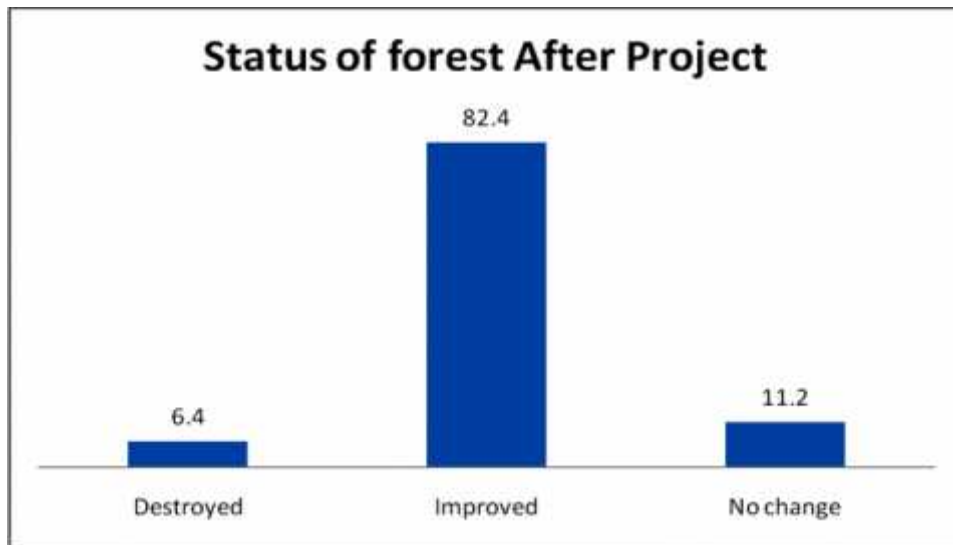
The infrastructural development may affect natural resources like forest. It is attempted to find out the condition of forest in the study area. What kinds of effects have been seen in the forest are shown in table 4.19.

Table 4.15: Status of Forest After Project Launched

Status	No. of HH	Percent
Destroyed	8	6.4
Improved	98	82.4
NO change	14	11.2
Total	120	100.00

Source: field survey, Feb. 2014

Figure 4. 5



The table and bar diagram shows that, the status of forest after the project launched with reference to environmental impact. Out of the total 120 respondents maximum proportion i. e. 98 (82. 4%) reported that forest has been improved. the lowest proportion i. e only 8 (6. 4%) respondents reported that forest is destroyed. Remaining 14(11. 2%) respondents reported that status of forest is no changing same as before.

To sum up, most of the people have been using the firewood as fuel and other lighting purpose in rural area. After launching the hydropower project all people have been using the electricity as main lighting and cooking food. Therefore, forest has not been destroyed but improving. This in the positive symptoms of electricity in conservation of natural resources and environment.

4. 2. 17 Pollution by Project

There are different kinds of pollution. In this study it is attempted to find out the status of environmental pollution. Is there seen any kinds of pollution after generating hydropower? If so what kinds of pollution have occurred? The given below table shows that.

Table: 4.16 Status of Environmental Pollution After the Project

Pollution	No. of HH	Percent
Yes	114	94. 8
No	6	5. 2
Total	120	100. 00

Source: Field Survey, feb. 2014

Most of the infrastructure may occur the environmental degradation and pollution. In this situation a question was asked what is the environmental impact caused by the project? Out of the total 120 respondents, most proportion i. e. 114 (94. 8%) reported that there is environmental pollution and remaining 6 (5. 2%) respondents reported there are no any kinds of environmental pollution after the project.

In addition, every change consists positive and negative impact but this project consists more advantages rather than disadvantages although this study shows more pollution by the project. When the project is started they have to needed long tunnel and power house which had damaged natural environment i. e forests, fertile land. when industries were established then the sound pollution and air pollution was created. Similarly, due to the wastage of the industry the water pollution is also created.

Table: 4. 17 Types of Pollution Occurred After the Project

Types of Pollution	No. of HH	Percent
Landslide	72	71. 4
Soil erosion	8	6. 4
Rock fall	12	9. 6
Deforestation	14	12. 6
Total	106	100. 00

Source: Field Survey, feb. 2014

Out of 120 total respondents only 106 respondents reported that there is environmental pollution after the project. The maximum respondents reported that landslide which is 72 (7.14%) and least respondents reported that soil erosion which is 8 (6.4% after the project launched).

4.2.18 Women's Participation

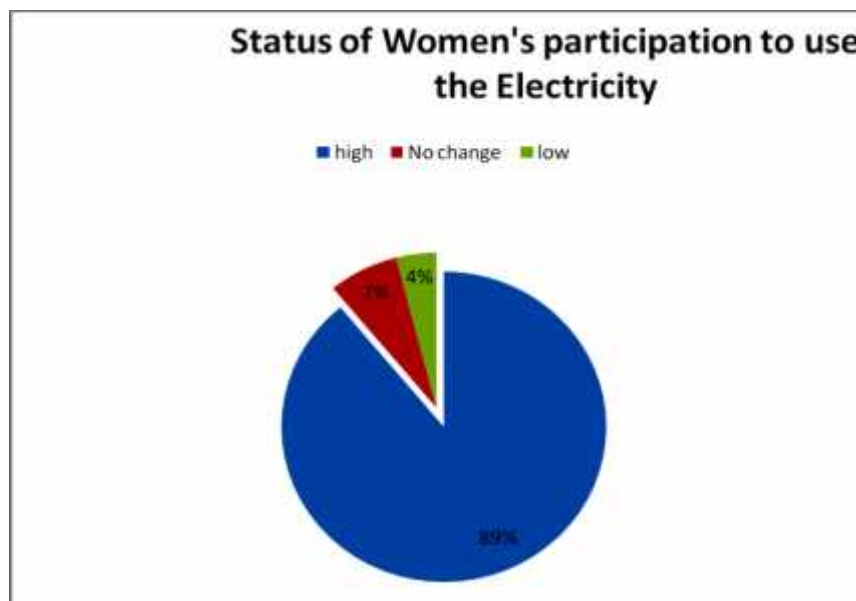
Women are backward in our society with reference to every issue. They have not courage and proper knowledge about every subject matter. But, in the study area women's are highly participate to use the electricity than man in the sense of household use.

Table 4.18: Status of Women's Participation to Use the Electricity

Status	No. of HH	Percent
High	108	89.2
Low	4	3.6
No change	8	7.2
Total	120	100.00

Source: Field Survey. feb. 2014

Figure 4.6



The Table shows that status of women participation to use the electricity. Out of total 120 respondents highest proportion i. e. 108 (89. 2%) reported that women's participation is high in the use of electricity. likewise lowest proportion i. e. 4(3. 6%) reported low and remaining 8 (7. 2%) reported there is no women's participation in the use of electricity. it is because Nepalese women are particularly engage in household works like cooking food, lighting, using electrical devices (TV, Telephone, Iron etc,) Similarl, in the case of small and cottage industries women's are mostly engaged rather than man It is because the willingness of moving outside for job purpose of man is higher than women. So, women's participation ratio to use the electricity is higher.

4.2.19 Establishment of Industries after Generating Electricity in the Study Area

Table 4.19:Establishment of Industries after Electricity

Establishment	No. of HH	Percent
Yes established	120	100.00
No established	0	0.00
Total	120	100. 00

Source: Field Survey. feb. 2014

Among the 120 total respondents, 100 percent respondents reported that the industries are established after generating electricity in their village. But no one reported that industries are not established in their village or ward.

4. 2. 20 Types of Industries Established in study Area

After generating electricity, there established different kinds of industries among them furniture, greel industries, block factory, saw maill, seller maill and other handicraft industries.

Table 4.20: Types of Industries Established

S. N	Name of Industries	No. of HH	Percent
1.	Furniture industry	48	40.00
2.	Greel industries	12	10.00
3.	Block Factory	10	8.3
4.	Saw mill	16	13.3
5.	Seller mill	28	23.3
6.	Small cottage industries	6	5.00
Total		120	100.00

Source: Field Survey. feb. 2014

From the above table, furniture's industry is seen mostly developed as compared to others. Similarly, small and cottage industries development is seen furniture industry and less of the respondents are in favor of cottage and small industries. Where in favor of the, furniture industry, greel industry, block industry, saw mill, seller mill and small cottage industries take place 40 percent, 10 percent, 8.3 percent, 13.3 percent, 23.3 percent and 5 percent respectively, This data implies that this project is mostly used to develop the small scale industries so, it needs to develop the large scale industries and contribute to the Gross National product of the country.

4.3 Importance of Electricity to Develop the Cottage Industry

By the different review and the launching this study I have found the same importance of hydroelectricity to develop the cottage industries. Which is mentioned point wise as below?

4.3.1 Infrastructure Development

Infrastructure development is the crucial factors to develop the industry as well as the cottage industry, Infrastructure development refers to the development of road, building, bridge raw materials etc. To develop these infrastructures

electricity plays the vital role in this way infrastructures plays the vital role to develop the cottage industry and electricity plays the vital role to develop the infrastructure so that, electricity plays the major role to develop the cottage industry.

4. 3. 2 Human Resource Developments

Human resource does not indicate to the total population of the country it indicated skill and educated man power of the country, to be the skilled people have to learnt computer training , language training, and operating training and so on. . for this electricity plays the pioneer role. for the well operating of small and cottage industry skilled human resource is needed.

Similarly, to operate the cottage and small industry educated people may be needed but to be the educated people electricity plays the vital role. So that, to develop the cottage and small industries human resource development in essence.

4. 3. 3 Local Market Developments

For the efficient development of local people or to increase the living standard of the local people, local output is to be increased for the increase of local output, the local market should be expanded. For the expansion of the local market the local output should also move to other forms of the local market. for this communication and transformation is needed to which electricity plays the major role. So that, hydroelectricity plays the major role to develop the cottage industry through the local market development.

4. 3. 4. Development of Trade and Commerce

Trade and commerce is major of an economy. Advanced economy develops favorable trade and commerce. Expanding trade and commerce also shows the development of an economy. The adequate facility of electricity promotes external as well as internal trade.

Electricity is required to run industries, if people have facility of electricity, they can use and demand electrical and electronic goods like iron, washing machine, radio, TV, computer etc. These goods are useless in the absence of electricity. Electricity is very essential to produce electronic and electrical goods. for instance, electricity is essential to advertise trade and commerce through electronic media. Computer is the most effective device to prepare account about trade and commerce. So that, Through the trade and commerce electricity promotes the production and distribution of small and cottage industry.

4. 3. 5 Developments of Tourism Activities

Nepal is a beautiful country. Beautiful natural sceneries, multicultural society, important historical places, bio-diversity, favorable environment, climate mix up and many other characteristics have identified Nepal as a beautiful country in the world. All these features attract tourist to visit nepal every year. Tourist are come from defferent countries to the whole universe and they are attracted from deoestic materials which are made by small and cottage industries, they purchase different domestic materials it helps to improve the condition of small industries. If there is no sufficient electricity it is impossible to develop tourism related materials which reduce the gross national produce ultimately. With the help of electricity rourism activities increases and it positively affect the cottage industries.

CHAPTER - V

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

Nepal is a mountainous, landlocked country wedged between two growing economic powers India and China. Agriculture sector is the main stay of life but this sector witnessed dismal performance in spite of a top priority in different periodical plans.

Nepal, a least developed country of the world has a lot of possibility in hydropower sector by which the nation can overcome the poverty. Hydropower is known as white gold. Nepal is the second richest country of the world and it has 3.34 percent share of world's hydro-potential i. e. 83 million Mw on the basis of hydrology and topography the technical hydropower potential is accounted 45,520 MW and the economically exploitable capacity of the kingdom, however, is 42,000MW.

Energy is a basic requirement for development. 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 sources viz. Traditional and commercial. Electrification creates various opportunities of development activities in rural area. traditional sources of energy are not sufficient to meet the energy demand. Nepal has a great hydropower potential with its more than 6000 rivers and streams. Most of the electricity is supplied to important canters and far from villages of hills and mountains.

Nepal has a long history of development of hydroelectric power: its development is still at an infant stage. Before the beginning of planning period, Hydro-electricity and other energy generated was only for ruling class people. so there were no specific rules in this sector. It was only after the beginning of first plan in 1956, certain policies were introduced to develop hydropower

sector. Since, than slowly and gradually hydropower has been developing but the pace is not quite satisfactory. still we are not able fo meet the domestic demand. The Ninth plan (1997-2002) adopted a long term policy with a view to increase the share of electricity in total energy consumption from about I percent to 3.5 percent in the next 20 years.

Nepal has occupied the second position in the field of the water resources in the world. But now a days load shedding is khown as burinng issue in Nepal. In this complex context small as well as medium and large scale hydropower project plays the pioneer role to develop the all sector of the economy.

This is a descriptive study designed to find out the socio-economic impact of Modikhola hydropower project of Deupur VDC of Parbat District. This study conducted form the questionnaire method among 120 respondents. In major findings of the study area are explained below.

In the study area, proportion of male respondents are higher 97 and female respondents are lower only 23 and Brahmin is found highest 9i. e. 87. 7%) and lowest proporiton of respondents found is Boaisya (i. e. 0. 8%). The living standard of all respondents it means, 100 percent has changed after electricity. Hinduism is the only one religion in the study area, there are no other religion only 19 respondents are illiterate among the 120 respondents, most of the people are engage in teaching profession in the study area.

After having the electricity there is positive impact in the house condition only 18. 3 percent house are made by cement before the project but after the project this ratio was increased to 41. 7 percent. 100 percent respondents reported that their children's education status is improved. In the study area main occupation is agriculture before and after the project but the ratio after the project is decreased than before form 80 percent to 61 percent. The highest proportion of respondents reported their family income increased after having the electricity facility by engaging in business as well service and industrial sector. The 100

percent respondents reported that before the project they use firewood for cooking and heating but after the project this ratio was decrease 14. 2 percent and 100 percent respondents use electricity after the project. In the study area there is agricultural income and non-agricultural income but non-agriculture income is higher than agricultural income. There is drastic change in expenditure pattern before and after the project because of high cost of materials and changiing environment. The maximum percentage of respondents reported that the condition of forest is improved after generaging the electricity. In the study area only few protion of respondents reported that there in no environmental pollution by the project. The maximum percentage of respondents reported that the Modikhola hydropower project affected tha social and cultural properties. The 100 percent of respondents is satisfied by the electricity because there is no load shedding in the study area besides the country is facing 18 hours load shedding at a day, which is also in increasing trend. The 100 percent respondents reported that there is high participation of women and use of electricity.

5.2 Conclusion

The hydropower potential is huge and the sustainable hydropower development becomes the key to make Nepal's economic growth scenario brighter, gaining deep inroads into the national goal and priority of poverty reduction. Energy plays a significant role in the economic development and technical advancement of societies, and concomitant with these it plays a crucial role in human welfare. Nepal's greatest energy potentiality lies in the exploitation of its immense water resources for hydropower generation. The theoretical potentiality of hydropower is estimated 83 Giga Watt. Whereas the technical hydropower potentiality is conducted 44 Giga Watt. The western development Region alone shres 25 percent of Hydropower potentiality in the Kingdom.

The Modkikhola hydropower project is being implemented to fulfill the increasing electric demand of the region. It has affected 600 households. The

more influenced village is Dimuwa, Tilahar of Tilahar VDC and patichaur, and Tapu of deupur VDC. The landslides, rock fall and soil erosion also increased due to construction activities.

The socio-cultural norms value is changed due to the concentration of large influx of people from diverse background. the level of awareness has increased in people. Opportunity, knowledge, skill etc. are available in the area and their economic status has become better than before. Some people with limited experience with cash transition and investment have not been able to properly utilize money, whereas some people have changed their traditional occupation into business, service and foreign labor. the three households have been migrated to pokhara and Chitwan.

The project has occupied 15 ha. land consequently the agriculture production is decreased and livestock decreased as well as species and fish are hampered by the project. After being project criminal activities are increased day by day and non-local technicians who are employed in this project they are married to local girls it spread the negative influences in this site. After generating electricity there is an increase in accidents related to electricity. Thus it is concluded that the project has mixed impact in the study area.

5.3 Recommendations

It is already known that electricity is not only the night partner of human being but also a 24 hours close friend. The electricity is able to make unification of the all nations of the world. Nepal is second rich country in the world with respect to water resources, but people of the remote area always have been living in dark not only at night time but also in day. People are far away from modern technology. Now days the most of the urban area, which are known as facilitated, have compulsions of load shedding. this complex issue has become the headache of government and common people.

The following recommendations are presented:

1. Detailed survey and estimation should be made of hydropower potentiality existing in diverse parts of Nepal to reduce unwanted natural calamity.
2. The clear and supportive policy and programmed ought to be developed and implemented in various regions of the country to drive the project on the prosperous way because it is herculean task if people do not think the project as their own.
3. The multipurpose hydropower project should be developed to subsidied those people who are victimized by the project given by job opportunities, irrigation facilities, electricity at low cost, drinking water, construction of public school buildings, health post buildings, to reduce the conflict between project and local people.
4. Government should formulate and implement the proper policy to mitigate the headache of load shedding.
5. There is a need for national consensus among the policy maker to achieve the national goal aptly because the pace of development activities is on zigzag path.
6. Infrastructure development is a pre-requisite for hydropower development, so concerned authority should be given due attention to this aspect.
7. It is suggested that there are both negative as well as positive socio-economic impacts of the project. But the negative socio-economic impacts are fewer than the positive socio-economic impacts. Therefore attempts should be made to broaden the positive impacts, which would largely be in favor of the locals.
8. The environmental friendly, technically feasible and economically profitable hydropower plants like Modikhola hydropower project should be installed.

9. Electricity duty should be promote to encourage small and cottage industries in remote areas e. g saw mill, seller mill, herbal product industry, cold storage, cheese and ice cream factory etc.
10. Participatory approach should be adopted to involve local people in the development activities as far as possible.
11. The benefit from the project should be distributed among the local people.
13. Income generation programmed should be launched in the area.
14. The compensation should be paid at time and in easy procedure.
15. Hydropower development should be considered as one of the most important agenda of economic development. it should be taken as exportable good to the neighborig country, so that not only the foreign currency could be saved but trade deficit with these countries could also be decreased considerbly.
16. Preference should be given to mobilize domestic financial resources by encouraging private sector to invest in hydropower projects. Government should provide loans at concessional rate to encourage local people for the promotion of small and micro hydro project.
17. The process of electrification should be demand oriented rather than project oriented. just launching the project is not the major task rather people should have access in to cheaper unit cost. Furthermore, the supply of hydropower should be reliable.
18. Attraction to foreign direct investment by legal and intitutional reform.

Everything has naturally more or less negative impacts. Anyway, we should try to avoid them. As we deal with social negative impacts, most of the people should be provided employment and other facilities. The illiterate people should be trained about their occupations. furthermore, dealing with environment on the project directors as well as the workers should be honest and considerable. They should establish their project by observing the field

whether it is barren or fertile. If it is a fertile, it may create disputes and a violent situation may emerge because people would be seized from their traditional work and ancestral property. It will be better if the project is conducted in a specific area which will not rob off the locals from their rights and properties. In fact, the project should help the surrounding locality to be in a better off position.

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Appendix 1 Questionnaire

A study on the socio-economic impact of Modikhola hydropower project.

(Only for project affected households and areas)

1. Personal information

a) Name of the household

head:.....

b) Sex: Male () , Female ()

c) Age:.....

d) VDC:..... Village

.....

Ward No:.....

2. Name of the respondent:

.....

a) Sex: Male () , Female ()

b) Age:.....

c) Cast: () Brahmin () Chhetar () Boaisya, () Sudra, () Newar () others

d) Religion: () Hindu, () Buddhist, ()

Islam, () Christian, ()

Others.....

e) Educational level;.....

f) Relationship with household head:.....

3. Main occupation of family

a) Agriculture () b) Business ()

c) Service () d) foreign job ()

e) Laboring () f) others ()

4. House Condition:

House	Before Project	After Project
Kanchchi (stone-mud)		
Pakki (cement)		

5. Children going to school.

Age (years) / Sex	5-15	15-25	Others	Total
Boys				
Girls				

6. Occupation of the head of HH

Occupation	Before Project	After project
Main		
Secondary		

7. Fuel/ wood consumption

Types of fuel	Before the project	After the project
Types of fuel		
fire Wood		
Gobar Gas		
Electricity		

8. Ownership of Modern durable items

Name of items	Before the project	After the project
Radio		
Television		
Torches		
Others		

9. Employment Situation

Before	After

10. Could you please mention your household expenditure(Annual)?

Items	Amount Before Project	Amount at Present	Remarks
Agriculture			
Food stuff			
Animal fodder			
Edu/health/social			
Miscellaneous			
Interst paid			

11. Income source(RS/month)

	Items	Before Projcet	At Persent
Agriculture	Food grain		
	fruits		
	livestock		
	vegetable		
Non-Agriculture	Service		
	Business		
	Rent		
	Pension		
	Contractor		
	Labor		

12. No. of Family member working in this project.

S. N.	Name	Sex	Age	Qualification	Work	Salary
1.						
2.						
3.						
4.						

13. Has the project affected social and cultural properties?

.....

14. Is your land value affected by the project?

.....

15. What is the impact of the project on infrastructure?

Negative Positice

Telephone

Transport/Road

Shool

Helath

How the project Affect;

1. 2.

.....

3..... 4.

.....

What are your suggestions to minimize the losses?

.....

16. What are the major physical impacts caused by the project?

S. N	Description	Frequently/Present		
		Increase	Decrease	Same
1.				
2.				
3.				
4.				

17 Positive impact of the project:

18. Negative impact of the project:

19. Annual income of the family

Before the project Rs.....

After the project Rs.....

20. Land ownership of the family

(in ropani):.....

21. Which is the main sources of energy in your family before installation of this project?

Fuel-wood () , Animal waste ()

Biogas () / Solar home system ()

Petroleum produces () , Electricity ()

others () ,

22. For what purposo do you use Electricity?

(a) Lighting () (b) Pumping ()

© Cooking food () (e) Others:.....

23. How much money do you pay for Electricity per month?

24. After electrician, do your children's study hours have been increased?

yes () No ()

If yes, how much time has been increased ?

Up to 1 hrs () 1 to 2 hrs ()

2 to 3 hrs () more than 3 hrs ()

25. Has their performance at school improved?

yes () No ()

26. Occurrence of accidents related to electricity?

Yes () No ()

27. How much money was spent for treatment and where?

28. Are there any low level technicians around the village?

29. Social impact

Do you know any non-local technicians married to any local girls?

yes () No ()

It yes, where and how?

30. Have your living standarad been changed after generating electricity?

Yes () No ()

31. How much thime didi you spend to collect the firewood before and after the project?

(a) Before:..... (b)After.....

32. What is the condition of forest after this project launched?

(a) Destroyed () (b) Improved () (c) No Change ()

33. Are there Establishment any kinds of industries?

(a) Yes ()

If yes, what kind of industries established?

Name and type of industries	Function of industries

34. Are your family employed in the industries?

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

35. What is the women's participation ratio to use the electricity/

(a) High () (b) Low () (c) No Change ()

36. You have any suggestion for this project?

.....