Chapter I

INTRODUCTION

1.1 Background

Nepal is the country of geographical diversity which has different land topography and bordered by India to the south, west and east and china by to the north. The country covers an area of 1,47,181 sq. km and is bounded by the northern latitudes 26.22' and 30.27' and the eastern latitudes of 80.04 and 88.12'(FRD,2005). The census(2010) estimated the population of the country is 2,64,94,504. More than 85%(REDP. 2010) of the population lives in the rural area depending on agriculture and the natural environment for substance livelihoods.

Tropically, the country is divided into three geographical regions. They are Mountain, Hill and Terai.Mountain consist of 35% of total land area and 7.8% of total population. Hill with 42% of total land area and 45.2% of total population and Terai in the south with 23% of land area and 47% of total population.(Rijal, 1998). Administratively, the country is divided into five development regions namely the eastern region, the central region, the western region, the mid-western region and the far-western region. These regions are further divided into 14 zones with 75 districts consisting 3915 VDCs and 99 officially recognized municipalities including one metropolitan city is Kathmandu and four sub-metropolitan cites Lalitpur, Pokhara, Birjung and Biratnagar (FRD, 2010).

The total electricity generation in the Nepal including big hydro, small and micro-hydro and diesel is around 687.38 MW(including middle Marsangdi and 54 MW thermal) has been harnessed (NEA,2008 of the total installed capacity, big and medium hydro shares 88% of total country's capacity whereas micro-hydro covers only one percent(REDP, 2007). According to the NEA reports, the total electrification of country is around 40% and out of which 33% from national grid and 7% from renewable sector. The country is highly potential for hydro-power generation. It is estimated that the country's total hydro potential is 83 thousand MW, and 42 thousand MW is economically feasible(WECH, 2002). So far, only around 1.63% of the total economical potential has been exploited. It is estimated that globally more than 1.8 billion

people lack access to electricity (2001, World Bank). Majority of such population lives in rural area of developing countries like Nepal.

Government of Nepal has given high priority for the development of both urban and rural electrification. AEPC, DANIDA and NORAD supported ESAP, WB and UNDP supported REDP, EU supported institutional PV program, Nepal Electricity Authority, Kaduri AID, King Mahendra Trust, RADC are the main organization involved for electrification across the country. These organizations were mainly concentrated on energy program to replace expensive kerosene or insufficient lighting wood fuels mostly for lighting and cooking. The government and public utilities make an effort to extend the power grid to rural areas either urban consumers/ industries or national government subsidizing rural power supply.

The geographical remoteness, harsh climatic condition, low population density with minimal energy demand and low growth potential are some of the reasons why rural electrification costs. In Nepal electrification projects are no longer seen as technical interventions alone. Practioners and critics conclude that electricity if targeted at the poor alone would not be a realistic approach. This is often because the poor alone cannot risk the heavy financial investments that are required to build and maintain an electrical system. In addition, the lack of proper feasibility studies, quick assessments, and lone non- participation of the beneficiaries has led to failures in some cases.

Rural development of any developing and under developed countries is depended upon the availability and use of resources given directly or indirectly by nature. Therefore, the present policy is guided by resource allocation when there is crisis on these components then economic development is distributed.(Tiwari, 1995).

In the present condition of Nepal, energy plays the vital role of fulfillment of resources. It is the primary need for all economic and social development. Energy itself is not sustainable used connect to diverse process such as lighting bulbs charging battery is burning fuels and propelling machines.

Nepalese people are using 300 kg to 900 kg fuel would be per head per year for cooling and heating. Fuel wood consumption that in mountain has been estimated 640kg/ person 1year while for the terai it is 479kg/ person per year (Lekhak, H.D, 2003).

So, energy can be generated from falling water through the use of turbine, which can be used as mechanical power. This is known as hydro power. This power can be used directly to run various milling machine or can be converted into electricity by using generators. Electricity generated in this way can be used for lighting, heating and operating machines. Hydro- projects that generated that small amount of mechanical or electrical power up to 100 kw are called micro hydropower. Generally, these projects are classified on the basis of amount of power produced into large medium, small and micro hydro. In Nepal project up to 100 kw capacity are classified as micro hydro project (AEPC, Booklet, 2000:3).

Nepal is facing enormous challenges in the path of economic development. One of the major-infrastructures required for sustainable development of any nation is power sector, (SHD, 1997: IX) Due to the unique topography with scattered settlements the national grid electricity expansion has difficulties, so the electrification through micro-hydro is suitable. There are more than 6000 rivers and innumerable rivulets crossing the country. So, micro- hydropower has a great potentiality for fulfilling the energy requirements of rural Nepal to a great extent (WECS, 1975:7).

1.2 Statement of the problem

Nepal is the country of geographical diversity,here are innumerable hills, peaks and mountains. Because of the diverse features of hilly and mountain regions, which are sloppy and many rivers and rivulets flow forcibly from mountains to terai regions. The hydropower energy is the most feasible and alternative energy sources. Nepal is a developing country where 85.80% (CBS, 2002) people live in rural area, so the national grid are not suitable due to its high cost and roughed topography. In the context of Nepal and other countries, it is impossible to make the bigger than bigger hydropower it is the most expensive for make large –scale hydropower

So the micro –hydro is the most, which is cost effective and feasible in many areas in Nepal. Although it is feasible and the input cost is also not high the plant are not extended in satisfactory way. Some are running with low efficiency and some are completely failed during the recent random sample survey conducted on about 10% sample of the total of the total plants installed in Nepal, it was learned that around 30% of the total MHP are completely failed (Earth consult, 1997:23).

Nepalese economy is based on traditional system. In addition to agriculture other sector of sector of economy such as industry, trade and commerce transportation, communication and tourism are to developed yet due to their inadequate electric power and financial resource. Hydropower development can not be achieved more over infrastructures are required for power exploitation of other available resources in the country. Economic development has not got proper acceleration due to insufficiency of electricity

The pattern of energy consumption is based on tradition resources particular fuel wood dung, etc. The over exploitation of forest creates sensitive environment problems, petroleum product are utilized for transportation operations of machines and so on. The use of petroleum products creates sensitive environmental problems and large amount of foreign currency is needed to import the petroleum products. Nepal has limited sources of foreign currency exchange. As a result Nepal has been facing the problems of debt trap deficit and unfavorable balance of payment.

1.3 OBJECTIVES OF THE STUDY

The general objectives of the study is to evaluate the impact of Siudigadh Micro Hydro-power Project in rural development on socio-economic and environmental aspects and specific objectives of the study are as follows,

i) To study the socio-economic and environmental impact of SiudigadhMicro Hydro-power project.

ii) ii) To find out the attitude of community people towards Siudigadh micro hydro-power project .

iii) iii) To study the sustainability of micro hydro-power project in rural area.

1.4 Signification of the study

In the view of growing scarcity of fuel wood the other non –renewable energy sources and huge investment of commercial energy source the search for alternative energy source is prominent. In this context, many project have been operated but how far the project are succeeding in terms of end-use –efficiency, how far it effect for the upliftmen in the life of rural poor, how far the projects is succeeding in terms in terms of end –use efficiency, how far it effect for the

upliftmen in the field of rural poor, how far the project is succeeding in terms of overall socio-economic upliftmen of the rural people in their perception are leading issues that have been tried to access by this study. Moreover, there are many studies adopted in MHP. Hence, this impact study has been rounded on the pivot of rural poor and gender in socio-economic and environmental aspect.

1.5 Limitation of the study

This research has been conducted for this study is focused on socio- economic environmental impact of the micro hydro power project in the rural development of Nepal.

This is a project work mainly for an academic purpose based on information The budget , manpower ,theoretical and methodology limitation during research has been prevailed for the thesis work carried out by student. This study has been limited only to micro hydropower, which cannot be generalized especially to other types of plant.

The research has been limited in5 wards of PatadewalVDC of Bajhangdistrict. The impact that occurs by contraction of a MHP is the derivation of numerous social, economical and environmental effects. Thus the study has been limited only social, economical and environmental perspective. Moreover, the social indicators are less factual which had made some difficulties to analyze social impacts and pre-electrification information has been depended h on the user groups saying and other secondary information.

1.6 Organization of the study

The thesis has been divided into six chapters. The first chapter described about background of study, statement of the problem, objectives of the study, significances of the study, limitation of the study and organization of the study.

The second chapter has carried out a review of literature related to the study. Literature related to history of micro-hydro power, socio- economic and environmental impacts of Micro-hydro power in global, National and local level.

The third chapter deals with the research methods applied to carry out the study. It includes research design, nature and source of data, sampling procedure, data collection and processing procedure.

The introduction of the study area and the people, which include physical setting, socio-economic and culture setting of the study area.

The fourth chapter includes analysis and interpretation of the collected data and information. It describes socio-economic condition, community awareness on micro-hydropower and observed effects of micro-hydropower in the study area.

The fifth chapter includes summary, conclusion and recommendations about the impact of micro-hydropower.

CHAPTER II

LITERATURE REVIEW

Limited research has been conducted on socio-economic and environmental impact of micro-hydropower schemes projects. There are many studies have been done in other sector of micro-hydro project. Generally, the studies on medium, large, small and micro- scale hydropower projects have been conducted to identify various types of impact created by the rural development of micro-hydropower projects. This study has been carried out to report to the evaluation of micro-hydropower project, its social acceptance and economic viability. It encompasses many study area of micro-hydropower. But it is especially focuses to the investigations especially on such questions like who are the real beneficiaries and what extent do they get benefits. It also keeps the interest to finding the answer of the questions who gets the access to the rural lighting and why this study was conducted in touch of PatadewalVDC of Bajhang district. this study has been conducted to the socio-economic evaluation of the impacts of private and community owned micro-hydropower schemes on the members of rural communities who are not the owners of micro-hydropower schemes. This study helps to enhance the knowledge about nature and micro-hydropower project. It especially examines the satisfaction and dissatisfactions ratio of micro-hydropower users and tries to recommend for action to maximize the benefits to the rural poor people.

Among various sources of energy electricity more popular and available, continuously renewable, non-polluting efficiently and widely distributed and based on simple as well as flexible energy sources is micro- hydro power project in Nepal. It is technically feasible as well as economically viable and the most appropriate technology for Nepal indeed micro-hydropower projects are not sufficient to meet the national demand of electricity on one hand, we have no economic resources, technology and skilled manpower to install large scale hydropower project

on the other hand, small scale hydropower project can play very important role in such a context. This technology provides access to electricity and other mechanical forms of energy for agro processing. Because of hilly topography and enough availability of water resources the huge potential for micro-hydro power helps to reduce the potential. Alarming deforestation import of petroleum products there by playing a vital role to improve the economic condition of the people.

In the field of electricity in Nepal electricity from various form such as photovoltaic system, improved ghatta, biogas, plants, solar thermal units and improved cook stoves is generated. The government along with bilateral agencies, non- governmental and private organizations are engaged in the promotion of RE through national and regional programs. the system of transforming the energy come from sun into electric heat and light energy by the help of collector is feasible and viable in the context of Nepal. At present there are about 30 manufacturers of solar system and electricity installed capacity in the country is estimated at 10,000 sq. meter of solar panels for which is generated about 14 companies have been involved in the installation. Similarly, electricity has been generated from biogas, turbine mills, improved ghatta in Nepal which has shared the big part of electrification in Nepal and most of the poor people of rural area are benefited.

Role of Hydro-electricity in economic development is of great importance which is possible due to the enormous water resources as well as favorable topographic and climatic condition. The proper utilization of electric power accelerates the motion of national development as well as the community development as it provides job opportunities to the local youths. Actually, micro-hydropower project is very necessary for Nepal as well as rural areas where the national projects can't cover electrification. In such a place the small project as micro hydro power plant may be very useful. The micro-hydropower project conducted in district head quarter and as well as another place can't cover the whole district. So, the micro-hydro project of Siudigadh must be suitable and usable.

This study especially reports to the evaluation of Socio-economic and Environmental Impact and socially acceptance and economic viability of Siudigadh Micro-hydro Power Project in PatadewalVDC of Bajhang district. It encompasses many studies area of micro-hydropower. But it especially focuses on the investigation of such questions like who are the beneficiaries and to what extent do get benefit. This study is interested to know the constraints prevailed in rural energy. It also keeps the interest to find out the answer of the questions who gets the access to the rural lighting and why?And its socio-economic impact on the targeted area. This study was conducted in torture of PatadewalVDC of Bajhang district. The objectives of this study are to examine the characteristics and perception of those local people who are benefited by micro-hydro power. It especially examines the satisfaction and dissatisfaction ratio of micro-hydro

power users and tries to recommend for action to maximize the benefit to the rural people. It also tries to establish the indicators for monitoring the effects of any such actions.

According to the finding of the study, the viability of the technology under the set of technical and social circumstances, which prevails in perceived benefit, accrues to the mill owner as well as the community. It reveals that, in one hand, agro-processing makes positive impacts on community saving the drudgery, especially to women and in other hand; it is not effective to the cash starved people.

It says it is not fully beneficial where the time is consumed by the transportation to mill and waiting, although it depends upon the located area of the mill form the settlements. The study indicates that only one or two percent of the customers make payment in kind for the service of the mills who cannot afford the cash payment. But about, (3-10%) of village inhabitants are poorest in six ward of PatadewalVDC of Bajhang district who do not use the mill even with payment in cash because they do not have such affordability also. But it is naturally that the payment in kind is anywhere between 50- 5oo higher than the cash down payment depending upon the local prices of agro- based production. It further indicates that except the oil processing kol, the traditional agro- processing mills such as Dhiki, Okhal and Janto have not been replaced at all because this turbine mill has not been able to reduce the risk of reliance of the community vis-à-vis traditional practices.

Dhital.(2003). In a conference paper presented in international conference on renewable energy technology for rural development (Returned 03) presents important information to the energy sector, which combines the present states, past experiences and future plans of the energy sector with the view of national and foreign experts. The study tries to analyze the initial evaluation of investments and optimize the components to observe on total projects cost. This analytis deals with the approach for financial analyze to calculate the cost where three scenarios i.e. with subsidy, without subside and with net economic benefits.

HMG/N. (2000).Annual Report of Rural Energy (UNDP, Supported Rural Energy Development Programme.

The fairly informative report prepared by REDP, which has include the information of rural energy sector. The principal aims of this report are to give the message to the people about rural energy related areas, to appraise the impacts of energy and its related components. It tries to demonstrate the development path of rural development energy sector, to review on rural energy sector, policy and to raise the issues and give the solutions of the rural energy sector problem for the sustainable development.

This report mainly focuses on the information of execution of working to increase the level of energy services to poor citizens in the village of Nepal through technological development including micro- hydro, solar, biogas, improved cooking stove etc. This report connotes that the increased population increase the demand of resources that puts further pressure on the forest which is already in determine processes in Nepal. Desertification, ecological instability, loss of biodiversity, drying up water springs are some of the serious environmental consequences of massive deforestation. So most of the energy needed can be fulfilled by the big hydropower projects but which is focused only on urban areas. This efforts has largely ignored the rural population. This report raises the issues and focuses on the promotion of rural energy.

Hora. (1996). in her study "Role of Micro-hydropower in Rural Electrification of Nepal" explains that among the alternative energies more popular and available, continuously renewable, non-polluting and based on simple as well as flexible energy source is micro-hydropower in Nepal. It is technically flexible as well as economically viable and the most appropriate technology for Nepal needed, micro-hydropower projects are not sufficient to meet the national demand of electricity on one hand, we have no economic resources, technology and skilled manpower to install the large-scale hydropower project on the other hand, small scale hydropower projects can play very important role in such context. This technology provides access to electricity and other mechanical forms of energy for agro processing. Furthermore, it is also capable of providing rural electrification to a limited scale.

As PatadewalVDC of Bajhang district has a lots of potentiality for generating hydro electricity because of various reasons such as lack of finance, skilled manpower etc. and also not sufficient researches have been carried out in the sector of micro-hydropower. So, these are the problems involved with MHPs.

UNVN-2003- Water contains energy. The energy generated by downward movement of higher place can be converted into dynamic energy with the help of turbine we can run different machines directly and we can produced electricity's is called micro-hydropower project. Generally, MHP includes the project of capacity up to 100 KW.

ESAP.(Report- Social Mobilization for Micro-hydro Scheme- 2044, p. 39).

Semi- structured interview are both the separate tools to be used on their own and an important part of other, PRA tools. A part of tools the SSI is the depth discussion and probing to find out the how and why of information produced by the other tools often this comes at the end when map matrix of calendar has been produced and it is the social mobilization needs to understand the how and why without this interviewing the map and matrix or calendar will not give much insight into way community uses energy and sees micro-hydropower.

AEPC.(2063).Rural energy policy, Khumaltar: Alternative Energy promotion center:

Micro-hydropower sector in Nepal has al long history dating back to the 1960s. The private sector companies mainly the manufactures started providing services from 1970s. Electricity generation from micro-hydropower started agter1980s. and was ass- on activity at that period. Around 1990s micro-hydropower started getting recognized as a means of providing electricity in rural areas. Initial micro-hydro schemes were primarily addressing the need of processing, agricultural products and subsequently rural communities installed a large number of turbine mills.

Nepal is the first richest country in water resources in Asia and the second richest in the world. Nepal has about 6000 large and small rivers. The total hydro-power potential of these rivers is estimated baout83000 MW of and which 45000MW and 43000MW are technically and economically feasible. But only about 563MW hydropower is produced. The produced electricity is mostly used in urban than the remote rural areas, because of this condition the

remote rural areas are directly affected, in which, they are not getting clean and affordable energy. Thus, in Nepal there are lots of possibilities of micro-hydropower project in remote rural areas, which is very much, environment friendly and economically bearable. Recently **Rural Energy policy of Nepal-2063.**

Only the 121% are getting service of electricity from the alternative source of energy, where the national transmission line is not assessable to reach in the geographically remote area. From the MHP; 23MW, Solar energy; 12MW, wind energy; 20KW and Biogas; 11KW all together 35.03MW electricity is produced up to now.NPC, 2013.

Energy sources and supply in Nepal (oct. 2006).bykarki, Nepal has vast potential hydro-resources, the economic potential for hydropower is estimated at 43,000MW. Yet hydro-electricity accounts for only 1% of total energy supplies, firewood65% and agricultural waste 15% are still the main sources of energy, while petroleum products 8% have replaced dung 8% as the third most important source of energy supply in terms of energy content.

The national electrification rate is in 2006 around 45% with a very uneven region and urban/rural distribution. In urban areas, where less than 20% of the national population live the household electrification rate is close to 100%, the rural rate is around 38% being highest in the accessible low land region (The Terai) where electrification based on expansion of the national grid is made good progress and lowest in mountain communities that take from to horse to four days to reach by foot.)

Faced with slow progress in rural electrification based on grid expansion by a natural or regional power utility, many countries in the developed world have turned to alternative modes of supply based on the decentralized identification and implementation of energy projects. Nepal is no expansion to this trend in fact; it is one of the international successes in decentralized energy supply.

NEA, (2013). 'Community Electrification' As part of the government policy to promote community participating in rural electrification, the business group carried out community based electrification in various parts of the country and handed over the facilities to the community for operation. The government provided 90% of the capital cost of electrification, and the remaining 10% of the capital cost was borne by the community. NEA is responsible for maintenance of HT line where as communities/user's group is responsible for maintenance of LV distribution system. The public response to this initiative of NEA has over whelming. All together, about 73,000 households have been provided with electricity by the end of fy 2012/13 through 94 community groups.

Nepal Hydro & electric limited. (2013). by BPC, Nepal Hydro & electric limited (NHE) was established in2042B.S. By Butwal Power Company Ltd. Aistom power Norway As, Kvanerner energy (formally sorumsandverkstand) AS Norway, Butwal Technical Institute and Himal Hydro & General Construction Ltd, As the share holders, NHES capabilities include design, manufacturing and installation of hydropower equipment, mainly covering various types of hydraulic gates, stoplogs, trash racks, penstock pipes, medium six turbine housing, micro/mini turbines and substations and repair of electro mechanical equipment. Some fo the major jobs completed during fy2069/70 are as follows:

- ShaniBheri steel truss bridge at Rolpa district.
- Hydro-mechanical works of 10MW. AiprinHEP at Dolakha district.
- Runner repairing of NEA< Middle Marsyangdi, NEA Modikhola, NEA Sunkoshi and NEA Trishuli.
- Runner repairing of Khimpti, BhoteKhosi BPC JhirmukmKhudi and other IPPS works.
- Substation works of NEA good Lamahi, NEA ChameliyaHEP.
- Supply of substation equipment of NEA Butwal and Birgunj Substation.

The company posted a total sales turnover of NPR451 million during the fy 6069/70.A few of major contracts like that of Adhikhola up grading Project and Chameliya Hydro-electric project could not be completed because of the delay caused by the designated civil constrictors. Similarly, due to the delay caused by the Indian customers authority in granting approval to take items to India for hard coating.

Sapkota,(2012). Rural energy means energy that is environmental friendly and use for Rural Household, economic and social purpose such as micro and mini hydro, solar energy, wind energy, biomass energy etc. Rural energy is also known as renewable energy. Energy is essential to economic and social development improved quality of life. Similarly, renewable energy is a key element of sustainable rural development.

Pokhrel(2013).in his article "A Brighter future" clean energy need to change the story of Nepal as the country with the lower energy use and the highest potential. We can't afford to wait any larger. Denmark and Nepal share a vision of sustainable energy for all , and as long time partners, we have delivered concrete results in the cast twelve years, more than 1 million households have benefitted from our common engagement to accelerate access renewable energy technologies in rural Nepal. This has helped many women, children and families to better health, it has created green jobs, and it has mobilized billions of rupees of local environment in the renewable energy sector. At the same time the alternative energy promotion center has become a driver of change in developing the renewable energy sector in Nepal.

NEA,(2013). Environment and social studies Department" Environment and social studies Department (ESSD) is of the integral departments of Engineering services Business Group. This department executes activities related to all aspects of environmental and social aspects of hydro-power and transmission line(TL) projects being planned, designed, constructed or operated by NEA.

This department is commercial unit of NEA and with its technical expertise involved in conducting environmental Impact assessment (EIA) initial environmental examination (IEE), Social impact assessment (SOA), vulnerable community development(VCDP), acquisition competition Resettlement plan (ACDP) studies and monitoring and environmental edition of hydro-electricity, transmission line and distribution line project.

During this fiscal year 2012/2013, ESSD was engaged in overall environmental assessment monitoring and protection of environment. The department successfully conducted several environmental studies ot of which IEE of upper Trisuli3'A' Matatihtha220KV TL, IEE of Lamahi-Ghorahi132KV TL and IEE of Solu corridor 132KV TL have been approved ministry of energy (MOE). Similarly, the department completed environment and social impact assessment (including environment assessment, venerable community development plan, social impact assessment) of Kaligandaki 'A' HEP and report are approved by the World Bank. Currently ESSD has been undertaking environmental monitoring and mitigate in of Chamalia hydro-electricity project, Bharatpr-Hetauda220KV transmission line, Trisuli3'A' hydro-electricity project, and Kebely corridor 132 KV transmission line by establishing environmental management units at project site. Recently, an EMU has been established monitoring of Dumere-Damauli KV transmission line. At present, the department carried out the following assignments in the fiscal year 2012/2013.

1. EIA completed projects (reports submitted to concerned ministry/ department of approval)
   –Kohalpur-surkhet132KV TL

2. IEE completed projects (report submitted to ministry of energy for approval)
   - Kusna- Kataiya132KV TL
   -Koshi-corridor 220 KV TL
   -Raughat- modi 132 KV TL

3. TOR and scoping of following projects
   –Tamakoshi v HEP
   –Dordi corridor 132 KV TL

ESSD also conducted School Support programs in the project affected area of Khimti-Dhalkebar 132 KV transmission line. Valuable inputs were also provide by ESSD in theabatement of hazardous polycarbonate (PCB) in transformers owned by NEA.

Shakya, (2070B.S.). "**Nepal electricity authority transmission network and its losses**"- electricity power transmission is the bulk transfer of electricity from generating to located near demand centers. This is distinct from the local wiring between high-voltagesubstations and customers, which is typically referred to as.

Power generated in power stations pass through large and complex network like transformers, overhead lines, cables and other equipment's and reaches at the end users. It is fact that the unit of electric energy generated by power station does not match with the units distributed to the consumers. Some percentage of the units is lost in the distribution network. This difference in the generated and distributed units is known as transmission and distribution loss. In Nepal, average T & D (Transmission and Distribution) losses; have been officially indicated as about 25.03% of the electricity generated. Out of which,grid transmission loss is -6 % of total available energy.

Accurate estimation of T & D loss has gained importance as the level of losses directly affects the sales and power purchase requirements and hence has a Bering on the determination of electricity tariff of a utility. Today, transmission level voltages in Nepal are usually considered to be 66 KV and above. Lower voltages such as 33 KV are usually considered voltages but are occasionally used on long lines with light loads. Voltages less than 33 KV are usually used for Voltages above 220 KV are considered and required different designs compared to equipment used at lower voltages.

The overall losses the power plant and distribution network is than in the range between 3% and % from the energy assessment, it can be conducted that 100 units saved at home can save 125 units at the power plant. This should be a real encouragement to save energy for a greened environment.

BPC. (2013). "Sustainability", Sustainable development is at the core of BPCs business and value BPCs business decisions and operations invariably integrated economy, economy, environmental social dimensions. BPC has been carrying- out series of social,environmental and economic development activities in and around its project areas and plan to continue them in future in a sustainable way in collaboration with the variousstakeholder organizations in the project area.

- Economic Dimension:has been reporting sustained level of revenue generation, in spite

of the poor performance of share market throughout the year, BPC share performed satisfactorily reflecting the markets confident in the company. With the plan of business expansion of building new hydropower projects such as Kabeli- 'A' which is nearing realizations, the company is expected to do better. Further with political stabilization in the horizons, environment to attract the investment in Nepal will help BPC's objective to expand its core business area. BPC continues to focus on bringing internal efficiencies to walk process and on rationalizing its investment where possible to count the challenges it faces.

- Social Dimensions: Social impact assessment study is conducted to set the socioeconomic baseline before implementation of projects, which helps in identifying impacts and recommending mitigation measures in the affected area. BPC has mobilized its own nad external resources to implement social development project in its area. Jhimruk Downstream Mitigation Project (JDMP) is an example, where, BPC has been able to mobilize resources to implement activities in the field of social, environmental an economic development. Similarly, awareness programs, capacity building training programs has also been carried out to enhance the skill and the knowledge enabling the communities to initiate new economy activities. The company has been assisting people in and around its project areas to up-lift their social and economy standard through prioritizing employment and other income generating activities. As a result of people and improve their economy condition which will ultimately help in sustainability of the project development.

The Rural Electrification Programmers. (1998). by "Rijal (ICIMOD)", this program is being implemented by the Rural Electrification Corporation (REC) and aims at supplying electricity to all village. By the end of 199394, more than 85% of the 580,000 villages in the country were reported to have been electrified and over 10 million pumps energized (CEA 1996). While this has been an impressive achievement, the number of households having electricity connections is still quite low, only about 30%. One of the important reasons for this is the unaffordability for the majority of people who could otherwise avail those selfs of the benefit. The quality of supply has not been consistent either, because of poor loads and long distance transmission and distribution. The energy station of pump sets for irrigation has on at a briskpace, exceeding 10 million out of total estimated potential of 14.5 million pump sets but

there are still a large number waiting for electricity connection. But an even more serious problems in this sector is the heavy subsidy electricity given to farmers (Most of the states, the tariff is negligible not more than half a rupee per unit. In many cases, the bill collection system, due to diffused nature of the sector, is expensive and cumbersome. Given the fact that the tariff is extremely low electricity is consumed in an inefficient and wasteful manner. Because of these many State Electricity Boards (SEBs) have been in carrying huge losses. Till March 1992, the cumulative loss of ESBS was Rs. 41.2 billion. Also, the price for agricultural has become a major political issue with middle income and rich farmers representing of powerful lobby opposing any more to rationalize the pricing structure.

Nagakhusi, (2013)."In has development advocate Nepal, making of improved cooking stoves in Nepal", In Nepal, 74% of total energy consumption comes from fire wood and majority of it is used for cooking on average Nepali Women who do the bulk of household work, spent 6 hours daily in collecting fire wood. Improved cook stoves (ICES are a mature energy technology for the efficient conversion of energy from bio-mass to head. They are designed to consume less fuel and save cooking time, to be more convenient and to be smokeless or at least to reduce substantially the volume of smoke produced during cooking when compared to traditional stoves. The direct and indirect benefits of ICS include increased thermal efficiency, forest conservation by reducing firewood consumption, reduction in women's labor, reduction in indoor air pollution and smoke released health disorders, prevention of fire hazards, and reduction of cooking time. In 2012 UNDPs various projects helped to install 24,120 improved cooking stoves across Nepal. In this photo series, Rattan Man Maharjan making improved cooking stove for MRS. Chiri Maya Maharjan in Bungmati, lalitpur. This particular initiative was supported by UNDP-Global environment facilities small grants programs and implemented by new initiatives.

Communicator NAST, Aug. 2012). "Wind turbine of 1 KW installed at NAST", more than 50% people have no access to electricity in Nepal at present and those who have access are facing more than 16 hours load shedding per day throughout the country. In this context, managing energy crisis for the day to day life in the country is a challenging issue. The rate of energy consumption is the key indicator of civilization. The energy consumption is also directly linked with socio-economic activities as well as round development of the nation. According to some preliminary studies, there is a potential of about 3 GW of wind energy in Nepal. Thus, it

is high time to explore the potential of wind energy on the basis of reliable measured data. When the reliable data will be generated the government will help to make the plans and programs to rescue to country from energy crisis in Nepal. Similarly, the measuring data are equally important for the researchers,promoters, and designers of the wind speed for energy calculation.

Nast has already installed two meteorological towers of 30 m and 34 m. in NetaPyuthan, Phulbari (Dang) respectively for the wind mapping in Nepal. Moving one step further, NAST has recently installed wind turbine of capacity 1 KW on its on building for power generation as well as for research purpose and it will be upgraded to Solarwind hybrid system to support the power back in the administrative building of NAST in the days ahead.

Communicator NAST, Aug,(2012)."Renewable energy exhibition 2012.held", in a bid to create awareness among general public about renewable energy products and their efficient use renewable energy exhibition 2012 was organized from March 14-15, 2012 at the premise of Nepal Academy of Science and Technology (NAST).

The exhibition was organized by the NAST in collaboration with alternative energy promotion centre (APEC), renewable energy test station (REST) and solar electric manufactures association Nepal (SEMAN, Ministry of Science and Technology, KalpanaDhamala inaugurated the exhibition march 14 admits a function attended by vice chancellors of NAST professor Dr. Surendra Raj Kafle, secretary of Ministry of Environments, science and technology executive director of AEPC president of SEMAN, academicians and staff a NAST, executive head of various companies related to renewableenergy business, reporters from different media as well as general public.

During the two-day exhibition more than 60,000 visitors visited the exhibition stalls and took advantage of the fair in different ways. Most of the stalls were crowded with the visitor during the business hours. The exhibition was successful in achieving its objectives by disseminating information to the general public regarding various uses and availability of renewal energy products in the market. Exhibitors as well as visitors underlined the need to organize such exhibition in the days ahead not only in Kathmandu valley but also in other parts of the country. As a pioneer institution of Nepal for introducing alternative energy technology, NAST assured to be in for front of its promotion in the coming days.

The event management team comprised of Mr. PremBasnet of RETS, Mr. Shishir Raj Kolachnapati and Dr. Suresh Kumar Dungel of NAST, and Mr. MukeshGhimire of AEPC.

Energy Trend in Nepal

Modern options that are considered technically proven and socially viable in Nepal include Micro-hydro, solar photo voltaic system, improved ghatta, biogas, plants, solar thermal units and improved cooked stoves.

Solar Home System

The system of transforming the energy come from sun into electric, hit and light energy by the help of collector is viable and feasible in the context of Nepal. At preset, there are about 30 manufactures of solar system and the total installed capacity in the country is estimated at 10,000 sq meters of solar panels. About 14 companies have been involved in the installation and there are 42,500 solar home system in 74 districts except Bhaktapur district. The total installed capacity of solar home system in Nepal is 1,584.5 KW peak power.

Analyzing above data, the trend of installing the solar home system is not dissatisfactory, solar home system was introduced in 9992 but it had slow growth rate up to 1992, when below 50000 panels had been commutatively installed in Nepal at the mid of 1999. Incredibly at the end of 2003 there were 42,500 plants in total, which indicates that the growth rate of solar home system has been highly increased since 1999,(CADEC,2004: p. 18). It is impossible to practice in cooperative way due to scattered settlement pattern and lack of cooperative sense in Nepal. Another system, the solar water heater technology has not yet been proud appropriate for Himalayan region.

Biogas

Biogas is a product of 'anaerobic digestions' of organic waste such as plants and crops residues and human and animal manure. It is an important and viable energy resources thus have expanded throughout the globe in the past two decades. Biogas at first was introduced in Nepal after the demonstration of it as modal in 1955,(Hora p. 1991:45), Later on 250 biogas plants were installed during the fiscal year of 1975/76.

In Nepal 3,318 biogas plant where installed in 1992/93 and reached the number of 37354 cumulatively at the end of 1997/98. Then due to the viability of this plant the installation trend was speeded swiftly and at the end of fiscal year 2001/02 the plants were installed in number of 95,055 in total. It is reported that about 90% of the plants installed in Nepal have a provision of toilet connection and more than 50% households have already connected toilet to their plants.

Due to the well proven, design and quality control mechanism, recognition of local manufacturers, provision of all seasonal subsides, accessibility of machineries and technical work by local people and implement possibility and biogas program has been successfully increased in arithmetic series in Nepal. But biogas plants have not been installed parallel in numbers compared to their effective demands. It is due to less effectiveness of slurry utilization program, inadequate research and development and ineffective and inadequate monitoring and evaluation mechanism. Along these constrains, biogas is not viable in all place in Nepal due to geographically and climatologically uneven regions.

Improved Ghatta

Ghatta, a spinning device to crossing the cereals and grains using kinetic power of water started to operate from the immemorial time. The devices used two hard stone slates knotting with a long modern churning stick are still seen operating at the bank of river mostly. These were operated traditionally and handled by local technology, later on, the technological investigation towards the local indigenous and traditional technology has progressively modernized the devices. In this process these traditional ghatta where change the figure to improved ghatta joining or fixing iron churning stick stone/ iron devices are fixed with it according to the geographical location of plant installed area and speed and volume of water.

Shrestha (2006) 'Role of Hydro-electricity in economic development' mentions that the development of hydro-electricity due to the enormous water resources as well as favorable topographic and climate condition. Hydro-electricity has tremendous advantages for the people, and it helps to develop energy sector economy. Electricity is one of the infrastructures of upgrading the socio-economic condition of nation. The proper utilization of electric power accelerates the motion of national development. Our experiences show that the developed countries like Japan, UK, USA, China, etc. achieved advancement in time through electric

power. At present, the stock of non-renewable sources like petroleum products, coal, natural gas, fuel, woods, etc. is decreasing. The hydroelectricity has become economically attractive because it is renewable and environment friendly. He has discussed the role of hydro-electricity in various economy as well as non-economic sectors. Industries, agriculture, transportation, social service and other sector can be promoted by the utilization of electricity. He has also discussed but the development during the plant periods.

Actually micro-hydro plant is very necessary for Nepal as well as rural area. where the national projects cannot cover electrification, in such places the small project known as micro-hydro power plant may be very useful. The micro-hydro power project conducted in district head quarter as well as another places cannot cover the whole district. So, the micro-hydro project of Siudigadh must be suitable and usable.

Chapter III

METHODOLOGY

Research methodology is the process of arriving to solution of the problems through planned and systematic dealing with the collection, analysis and interpretation of facts and figures. Research is a systematic method of finding sequential steps adopted by researcher in studying a problem with certain objectives view. The advanced learners dictionary of current English defines, Research methodology as , "A careful investigation or inquire specially through search for new facts in any branch of knowledge".

3.1 Research Design

Research design is a plan, structure and strategy of investigation to obtain answer to research questions. A research design is an arrangement of condition for collection and analysis of data in manner that aims to combine relevance to the research purpose with economy in the procedures(Selltiz and others,1959). Research design is a conceptual structure within which research is conducted.

The research study follows both descriptive as well as analytical research design.

3.2 Nature and Sources of Data

Both the primary and secondary sources of data have been collected.

A) Primary data

The research has been collected the primary data from the respondents by conducting structured and unstructured interviews at house hold level, informal discussion and simple field observation are the major method for the data collection. It is important as it allows greater flexibility in the form of interview.

B) Secondary Data

Secondary data and information have been collected from the sources mentioned below:

Human Development Report,Statistical year book of Nepal,Central Bureau of Statistics,Various plans, national planning commission,Department of alternative energy promotion centre,Department of water and irrigation,District Development community profile,Department of agriculture,Village Development Committee profile,

3.3 population and Sampling procedures

The present study is carried out in PatadewalVDC word no, 5 of Bajhang district of Siudigadh micro hydropower users are taken as the study which is 45 households. Out of them 30 households were selected by random sampling method.For this purpose 45 households were numbering from 1to 45 households, and kept into a basket. Then picked up the number i.e 30 and data were collected. The respondents of this study were indigenous people, professional, students, businessmen, male, female and all necessary.

3.2 Method of Data Collection

For the data were collectedthrough direct personal interview with help of structured questionnaire. Data were collected from 2071-6-20 to 207-7-22.

3.4.1 Household survey

For the household survey collection of information about socio- economic and environmental impact of siudigadh Micro- Hydropower plant. The questionnaire was designed with the help of respected supervisor of central Department of Rural Development.

The questionnaire consisted open- ended as well as closed ended questions. The questionnaire is divided into three sections. First section of questionnaire covers socio- economic impact, second section covers attitude of community towards MHP, third sustainability of MHP.

3.4.2 Key Informant interview

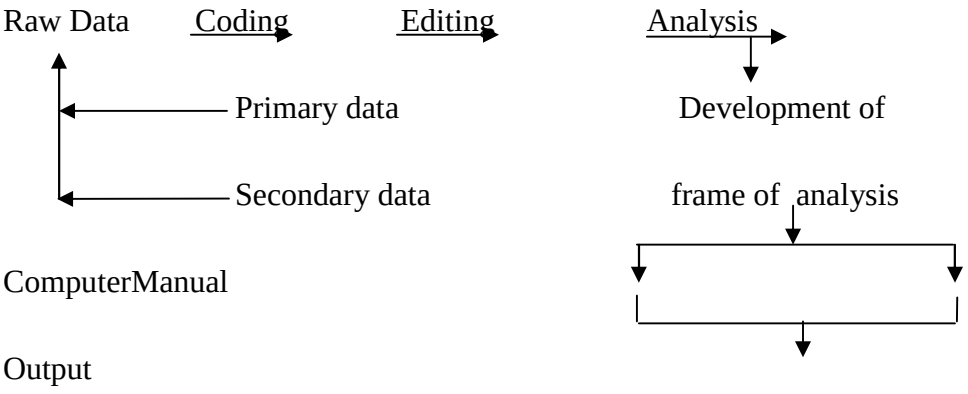
To support and triangulate the information of respondent interview is also conducted with key information such as environmentalist, personnel who are directly or indirectly or indirectly working in the micro hydro power and livelihood sector.

3.4.3 Field Observation

The working and living condition of people, their agricultural system, physical settings uses and impact of Micro hydro power and others is observed. Such observation helps to make judgment on the information provided by the respondents.

3.5 Data Processing and Analysis

Data processing and analysis is done by both ways, manually as well as by using computer software. The data obtained from the field were categorized, tabulated, processed and analyzed.



CHAPTER IV

DATA ANALYSIS AND PRESENTATION

Description of Study Area

The study site is mainly located in ward no. 5,patadewalVDC in Bajhangdistrict last Development region of the country. It takes about 3 hrs by bus from the district headquarter (chainpur) in summer and winter season but there is no transportation facility in rainy season.PatadewalVDC lies in south part from the District Headquarter. It is facilited by drinking water, agricultures and forest.

The total population of patadewalVDC according CBS census 2001 was 6310 (2885male and 3425 female). The numbers of household are 944. This VDC consists of various ethnic group but the dominating group are Chhetri and Beahmin. Nuclear family system represents the main basis of social structure.

Agriculture represents the main sours of income of PatadewalVDC. The average farm size is medium and fragmented. More then 50 percent the farm household own less then 40 Repaln of land. The agriculture production consists of food grains such as wheat, maize paddy and cash crops, livestock consists of cow, Buffalo, goat and sheep, literacy estimated at out of 60 percent. Health facilities are very poor in this village. But for general treatment there is facility. In the case of drinking water facilities, large sector of peoples drinking water from piped drinking water and there are some public telephone booths and Nepal telecom and SKY phone have provided mobile services to which serves all the population of the patadewal most of the population are benefited from the micro hydro power facility in the village.

Agriculture is the main source of livelihood more then 80% people are engaged in farming activities. Livestock are friends of the farmer. They use the dung of the animal in their farming land. It is the good sources of pesticide as well as energy for the plants crops. They can able to get fresh milk and milk related product, eat, which is essential for sound health. Animal like Bull are used for plunging as well as donkey are use as the rural transportation. People who are in service sector they are especially in Nepal army, police force and teacher.

The chapter four includes the analysis and interpretation of data. For this purpose data are tabulated at first then analyzed. This chapter is divided into three sub-chapters. The first part of the chapter covers the socio-economic and environmental impact of SiudigadhMHP. Second part covers the attitude of community towards Siudigadh micro hydropower project, and third parts of the study covers the sustainability of micro hydro-power project in the rural area.

4.1 Socio-economic and Environmental impacts

There may be so many impacts of everything, the first part of the chapter covers the socio-economic and environmental impact of the MHP plant. This study was focused especially what types of changes occurred in social as well as economic sector. Then, what kinds of effects have seen in environment after the plant implemented. For detail different data are tabulated and interpreted as follow.

4.1.1 Change in Living Standard

The modern facilities mostly affects in human being. After using such facilities it is expected that there must change in living standard of human. Actually living standard refers to the higher living. The table 5.1 shows that aggregate status of living standard after electrical facility.

Table 4.1

Change in Living Standard after Electricity

Change	Number	Percent
Changed	14	46.7
Not changed	4	13.3
Neutral	12	40

Source: Field Survey, 2014

It is expected that modern facility like electricity may affect 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. After the MPH plant, all respondents i.e 46% reported that living standard has been changed after the MPH.

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

4.1.2 Status of family income

Table 4.2

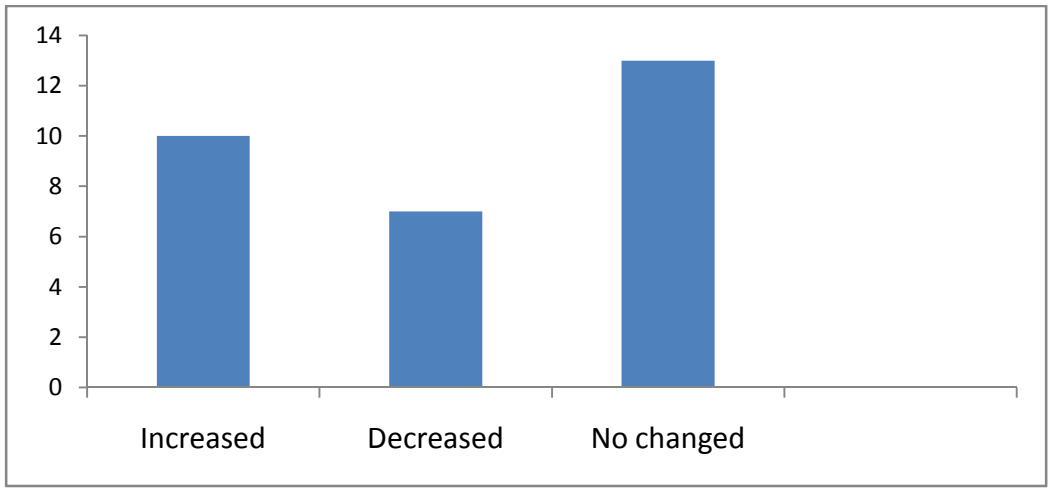
Status of family income after having Electricity

Status	Number	Percent
Increased	10	33.33
Decreased	7	23.33
No changed	13	43.33
Total	30	100

Source: Field survey, 2014.

Figure 4.2

Status of family income after having electricity



The table shows that the status of the family income of respondents. Out of total 30 respondents highest proportion i.e. 10 reported that their family income has increased. Among 30 respondents only 7 reported their family income decreased after using electricity and remaining 13 respondents reported that their family income is in neutral situation.

To sum up, those respondents who have able to using the electricity properly, who have sufficient knowledge and ways about electricity facilities, they have been able to increase family income. Those people who have credit of loan when interested in MHP. They reported that their family income decreased. Some of the respondents' income neither increased nor decreased.

4.1.3 Change in Health

It is said that 'Health is Wealth' when people are healthy then they can contribute a lot for the development of the nation. The health condition of an individual can be decreased because of various factors such as the improper use of traditional source of energy can also be harmful for the health of people. Electricity can play vital role for the improvements of the health of people as it helps to treat the patients at the time of illness as it helps to run different machineries which are used for the treatment. So, the following table shows about health condition in the survey area.

Table 4.3

Health condition

Status	Number	Percent
Positive	16	53.33
Negative	3	10
No change	11	36.7

Source:field survay,2014

The above table shows the facts that 53% respondents reported that they have felt positive change, 10% people felt negative and 36% people felt no change in health after the establishment of MHP.

4.1.4 Irrigation Facility

Irrigation is known as the important factor for farming. There is not chance of maximum production of crops in the absence of irrigation. The study area is located in hilly region. It is attempted to find out that either there is facility of irrigation or not.

Table 4.4

Situation of Irrigation in Farm

Irrigation	Number	percent
Yes	4	13.3
No	26	86.7

Source: Field survey, 2014

The above table shows that the availability or situation of irrigation in study area. Out of 30 respondents, maximum proportion i.e. 86% respondents reported that they have not irrigation facility in their farm. Remaining only 13.3% respondents has irrigation facility in their farm.

To sum up, irrigation is necessary to produce sufficient crops and other eating sources but the absence there is not proper management of irrigation in rural and hilly regions. This may also affects negatively in socio-economic status.

4.1.5 Effect in Drinking water

Some of the constructions may affects on different sectors. Electricity is nearest to water. Therefore, it may affects on drinking water on some places but not everywhere. This table 5.5 presents the situation that what is the effects of projects in drinking water supply.

Table 4.5

Effects of Project on Drinking Water Supply

Effects	Number	Percent
Yes	3	10
No	24	80
Unknown	3	10
Total	30	100

Source: Field survey, 2014

Out of 30 respondents, maximum proportion i.e. 80% reported that the project has no effects on drinking water. Similarly, 10% reported that the project has affected the drinking water supply and 10% respondents reported that they are unknown about the effects on drinking water supply.

4.1.6 Status of Education

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

Table 4.6

Status of Student's Education after Electricity

Status	Number	Percent
Improved	21	70
Not Improved	4	13.33
Unknown	5	16.7
Total	30	100

Source: Field survey,2014

The questionnaire that I had distributed to 30 respondents 70% of them reported that education status of their children is improved. Lowest proportion i.e. 13.33% respondents reported that their children's education status is not improved and 16% respondents were unknown about the education status of their children.

In addition, most of the guardians of schooling children found that their children have been studying at the night time using electricity by this time. It can be concluded that most of the student's education is improved after generating electricity.

4.1.7 Environmental Degradation

There are different types of pollution that degrade environment. In this study it is attempted to find out the status of environmental degradation regarding if there is any kind of pollution after MPH or not. The following table i.e. 5.7 shows the status of environment after MPH.

Table 4.7

Environmental Degradation

Degradation	Number	Percent
Yes	14	46.7
No	16	53.3
Total	30	100

Source: Field survey, 2014

The development of different infrastructure may invite environmental degradation and pollution. In this situation a question was asked either there is environmental degradation or not in rural area. In addition to this out of 30 respondents 46.7% reported that is environmental degradation and remaining 53.3% respondents reported that there is not any kind of environmental pollution.

In conclusion, it is found that there is minor environmental degradation during the construction of this MPH as it invites different sorts of natural disaster like landslide, soil erosion etc.

4.2 Attitude of Community people towards MHP

The chapter four is divided into three sections according to objectives. In this sub chapter or section it is attempted to find out the thinking, feeling and vision of the community towards MHP. What kind of mind making with respondents for MHP related data or tabulated and analyzed.

4.2.1 Effects in Social and Cultural Aspect

The invention of new technology can affect directly and indirectly in different sectors. The electricity is also known as modern technology in rural area of Nepal. The table 5.8 shows the effects of MHP in social and cultural aspects in rural area.

Table 4.8

Effects in Social and Cultural Aspect after Electricity

Effects	Number	Percent
Positive	18	60
Negative	12	40
Total	30	100

Source: Field survey, 2014

Among 30 respondents the highest proportion i.e. 60% respondents reported that there is positive effects on social and cultural aspect and the lowest proportion i.e.40% respondents reported that there is negative effects on social and cultural aspects in rural area.

In addition modern services directly and indirectly affects in traditional attitudes, eating, speaking, clothing and behavior. So MPH has also affected the social and cultural aspects negatively or positively.

4.2.2 Effects in Livelihood

Rural area is inhabited by the people of different caste, culture, tradition and occupation. So, different people may have involved in different occupations and professions like farming, business, agriculture, teaching and so on for their livelihood. The invention of modern technology may affects their source of livelihood. As electricity is also known as modern technology it has also some effects on the livelihood of the people. The following table 5.9 shows the effect of electricity on livelihood of the people in rural area.

Table 4.9

Effects on Livelihood after Electricity

Effects	Number	Percent
Change in Business	11	36.7
Change in agriculture	1	3.3
Change in Health	5	16.7
No change	13	43.3
Total	30	100

Source: Field survey, 2014

Among 30 respondents the highest proportion i.e. 43% respondents reported that there is no change in their livelihood after the generation of electricity. Similarly, 36.7%, 16.7% respondents reported that there is change in agriculture, health respectively and 3.3% respondents reported that there is no change in their livelihood.

In addition it can be concluded that electricity generation has helped in the livelihood of the people if we utilized it properly.

4.2.3Satisfaction of the community people

All the developmental activities in the community are done for the people. So, the all the people have equal right to take the advantages from such activities/ work. But because of the some factors some people may have taken more profit and some may be marginalized from such facilities. The people who have got proper access to the project may be satisfied and who has not proper access they may be unsatisfied. The following table shows the satisfaction and dissatisfaction of the community people to this MHP.

Table 4.10

Satisfaction of the community people to Electricity

Opinion	Number	Percent
Satisfied	24	80
Unsatisfied	6	20
Total	30	100

Source: Field survey, 2014

In order to know about the opinion of the community people about their satisfaction from this MPH a question was asked to 30 respondents among which 80% respondents reported that they are highly satisfied with this MHP and the lowest proportion i.e. 20% respondents reported that they are not satisfied.

4.2.4Effects in Health

Effects of MHP in human health may be positive and negative both. It is attempted to find out how many respondents positively and negatively affected by this after MHP with reference to human health.

Table 4.11

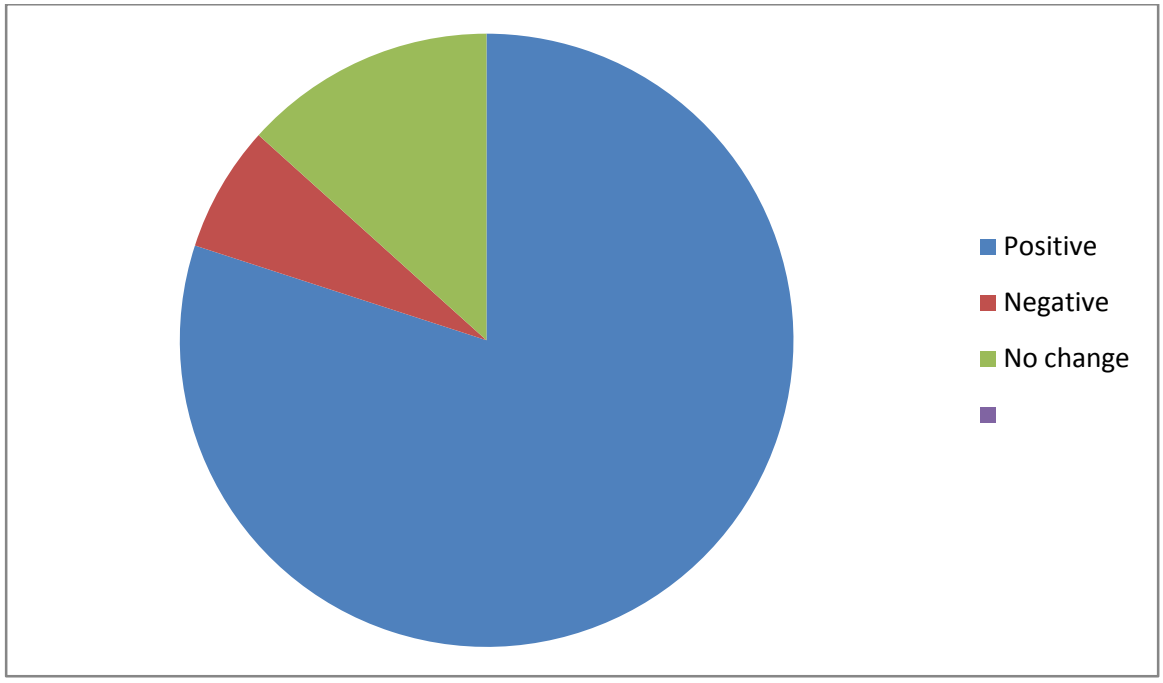
Effects of Project on Human Health

Effects	Number	Percent
Positive	24	80
Negative	2	6.7
Not change	4	13.3
Total	30	100

Source: Field survey, 2014

Figure 4.11

Effects of project on Human Health



The table and the above pie chart present the effects on human health. Out of total 30 respondents maximum proportion i.e. 80% reported that the electricity have occurred positive effects on human health. Minimum proportion i.e. 6.7% reported that there negative effects and 13.3% reported that neither there is positive nor negative change on their health.

To sum up, people of rural areas have been using the most firewood and kerosene for lighting or lamp. After the MPH people have drown up the use of kerosene and firewood as lamp then they are faraway from such types of smoking and feeling easy and healthy.

4.2.5 Attitude of Woman

Women are backward in our society with reference to every issue. They are not given priority in different sectors. Men and Women are known as two wheel of a same cart but it is limited only in saying not in reality. It is attempted to find out the attitude of women towards the MHP and use of electricity by a question positive, negative alternatives.

Table 4.12

Attitude of Women towards MHP

Attitude	Number	Percent
Positive	23	76.7
Negative	7	23.3

Source: Field Survey,2014

The above table shows that the attitude of women towards the MHP and use of electricity. Out of 30 respondents the highest proportion i.e. 76.7% reported that they have positive and remaining 23.3% respondents have negative attitudes towards the MPH and use of electricity.

4.2.6 Effects on Bio-diversity

To do any constructional activities we have to go against the rule of nature at that time we have to make the maximum use of natural resources that leads towards the decline of biodiversity. in order to know about the effects on biodiversity during the construction of this MHP a question was asked to 30 respondents whose response is mentioned in the following table.

Table 4.13

Effects on Bio-diversity

Effects	Number	Percent
Yes	5	16.7
No	25	83.3
Total	30	100

Source: Field survey, 2014

Among 30 respondents the highest proportion i.e. 83.3% respondents reported that biodiversity is highly affected and the remaining 16.7% respondents reported that there is no effect on biodiversity because of the establishment of this MHP.

In addition it can be concluded that because of the establishment of MHP the biodiversity is affected as it disturbs the life style of water animal.

4.3 Sustainability of MHP

The invention of anything is not better itself, but also repairing and maintenance should be necessary. There is not worth of construction in the absence of sustainability. For this purpose this third part of chapter four includes the ways of sustainability of MHP in rural area. What kind of methods and ways should be implemented for maintenance, which must be responsible for operation and maintenance? Here is attempted to explain the ways of sustainability. Related data are tabulated and analyzed respectively.

4.3.1 Responsibility of Community people for the sustainability

For the sustainability of any constructional work there is the big hand of community people. In the absence of active efforts of community people no constructional work can be long lasting. Following table shows that either the community people are responsible for the sustainability of MHP.

Table 4.14

Responsibility of Community people

Responsibility	Number	Percent
Yes	23	76.7
No	7	23.3
Total	30	100

Source: Field survey, 2014

Among 30 respondents the highest proportion of i.e. 76.7% reported that they themselves are responsible and remaining 23.3% reported that they are not responsible for the sustainability of the MHP.

4.3.2 Access of Community People towards MPH

Developmental works are done for the community people. If there is not proper access of all community people towards such developmental work then the sustainability of such work cannot be long lasting. So, for the durability of such developmental work there should be the proper access of all community people. The following table shows the access of community people to use electricit

Table 4.15

Access of Community People to use electricity

Access	Number	percent
Yes	22	73.3
No	8	26.7
Total	30	100

Source: Field survey, 2014

Among 30 respondents the highest proportion i.e. 73.3% reported that they have proper access to the use of electricity and remaining 26.7% reported that they have not got the proper access to the use of electricity.

In addition we can conclude that there must be the proper access of all community people for the sustainability of MHP.

4.3.3 Ownership of MHP

For the smooth conduction of any project there must be the ownership. The developmental work cannot be durable in the absence of ownership. Thus, the following table shows the ownership of this MHP.

Table 4.16

Ownership of the MHP

Ownership	Number	Percent
Community	25	83.3
NGO	2	6.7
INGO	3	10
Total	30	100

Source: Field survey, 2014

Regarding the ownership of this MHP the highest proportion i.e. 83.7% reported that there is the ownership of community people. Likewise, 6.7% reported that there is the ownership of NGO and remaining 10% reported that there is the INGO's ownership.

4.3.4 Availability of Skilled Manpower

The sustainability of the project depends on the availability of skilled manpower. If there is the availability of skilled manpower then the sustainability of the project can be extended. Table 5.18 shows the availability of skilled manpower.

Table 4.17

Availability of Skilled Manpower

Skilled manpower	Number	percent
Yes	23	76.7
No	7	23.3
Total	30	100

Source: Field survey, 2014

Among 30 respondents of study area the highest proportion i.e. 76.7% reported that there is the availability of skilled manpower and remaining 23.3% reported that there is not the availability of skilled manpower.

In conclusion, we can say that there must be the availability of skilled manpower for the smooth conduction and sustainability of any project.

4.3.5 Equal Participation

Equal participation refers to the proper participation of both male and female in the maintenance of any project. But in the context of our society women are given less importance in each and every sector. If there is not equal participation of people belong to different class, gender and caste then the sustainability of any project cannot be imagined. It is attempted to find out the equal participation in the maintenance and use of electricity by a question yes, No.

Table 4.18

Equal Participation

Equal participation	Number	percent
Yes	18	60
No	12	40
Total	30	100

Source: Field survey, 2014

The above table shows that the highest proportion i.e. 60% reported that there is equal participation in the use and maintenance of MHP and remaining 40% percent reported that there is not equal participation in the maintenance and use of electricity.

To sum up, equal opportunity and participation is necessary in the maintenance and use of electricity. Due to the lack of awareness and traditional thinking women's participation is constituted in low proportion.

4.3.6 Stakeholders of the MHP

The major responsibility of stakeholders is to maintain, invest for the sustainability of the project. In this study it is attempted to find out the stakeholders of the MHP.

Table 4.19

Stakeholders of the MHP

Stakeholders	Number	Percent
VDC	4	13
Local government	2	7
All	24	80
Total	30	100

Source: Field survey, 2014

The table presents the stakeholders for the maintenance and investment. Among 30 respondents the highest proportion i.e. 80% respondents reported that there is stakeholder ship of all local bodies, 7% local government and 13% stakeholder ship goes to VDC.

4.3.7 Proper use of electricity

The durability or sustainability of project depends on the proper use of electricity. Proper use refers to the right use of electricity in different sectors like factory, at home and for other developmental work. The following table shows the proper use of electricity.

Table 4.20

Proper use of Electricity

Proper use	Number	percent
Yes	18	60
No	12	40
Total	30	100

Source: Field survey, 2014

Regarding the proper use of electricity a question was asked to 30 respondents among which 60% reported that there is the proper use of electricity and remaining 40% reported that there is not the proper use of electricity.

In conclusion it can be said that the proper use of electricity is a must for the sustainability of the project.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Nepal has occupied the second position in the field of the water resource in the world. The feasibility is shown there may be possibility of 83,000 MW electricity but nowadays load shading is known as burning issue in Nepal. In this complex context lower power MHP may be note worthy in the rural area of Nepal. The SiudigadhMHP is known as an innovative attempts by a courageous people of PatadewalVDC of Bajhang district.

This has brought noteworthy modifications on the rural society.

This is a descriptive study designed to find out the socio-economic and environmental impact of micro hydropower project of PatadewalVDC, Bajhang.

This study conducted from the direct interview method among 30 respondents. Those respondents were selected by random selection. The major findings of the study are as follows:

- Proportion of Chhetri caste is found highest i.e. 100% in study area.
- The living standard of 47% respondents has changed after electricity.
- The highest proportion of respondentsi.e.53% reported that there is the positive change in health.
- 33% respondents reported that their family income is increased after electricity.
- Some respondents reported that there is not the facility of irrigation in the research area.
- 80% respondents has reported that the drinking water supply is not affected after electricity.
- 70% respondents has reported that the education status of their children has been improved.
- 47% respondents has reported that there is environmental degradation after electricity.
- The highest percentage of respondents (60%) reported that the MHP affected the social and cultural aspect positively.
- 80% respondents are satisfied with electricity.

- 60% respondents reported that there is the equal participation of women.
- The highest percentage of respondents i.e. 83% reported that the biodiversity is not affected after MHP.
- The maximum percentage of respondents i.e. 83% reported that there is the ownership of community.
- The 60% respondents reported that electricity is properly utilized.

5.2 Conclusion

Lower scale MHP may be most useful in rural and remote area. There is sufficient feasibility of such types of lower scale of MHP but neither governmental nor private sector's vision goes there. The conclusion of the study area as follows,

- Bajhang district is known as main place of ethnic diversity which is presented by Bhramin, Chhetri, and Dalit.
- Electricity is the closely related with human life therefore all respondents' living standard have been change after MHP.
- After electricity facility most of the respondents' family income is increased.
- In rural areas, farming and keeping livestock is main occupation but the respondents have not been able to meet their annual food needs by that occupation.
- There is poor irrigation facility in study area.
- After electricity facility students have been using evening time for study therefore it is found that the education status of student is improved.
- The origin of drinking water and MHP used water is in different places. So the project has not affected in drinking water in most of the study area.
- Major types of pollution has been found but minor types of pollution is found in study area.
- To make the MHP sustainable, repair, maintenance and operation schedule is prepared in power house.
- Regarding equal participation of men and women is not found for the maintenance and use of electricity in many parts of the study area.

5.3 Recommendations

Nepal is second richest country in the world with respect to water resource, but people in the rural area always have been living in dark not only at night time but also in day. People are faraway from modern technology. Nowadays the most of the urban area, which are known as facilitated, have compulsions of load shading. This complex issue has become the headache of governor and common people.

Due to this conclusion the lower scale MHP is relevance in remote and hilly area. The following recommendations are presented.

- Electrical energy must be established as a fundamental and basic needs of human being.
- Nepal is rich in water resource but there is not specific vision and policy of state. Therefore the government should formulate and implement the proper policy.
- In conflict affected area like Bajhang district the establishment of NGO and INGO is like mushroom but no one of them are related in small and large scale MHP. Their attention should go in this field and government must ruling them to do so.
- Government is quiet in the sector of small as well as large scale MHP. Government should increase the amount of subsidy for this project.
- The government in the sector of electricity should conduct feasibility survey.
- Community must be sensitive to demand necessary facility.

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Questionaire

1General information

a) Name of the household head.....

b) Sex:

Male ( ) Female ( )

c) Age.....

d) Family size.....

e) Cast: Ethnicity

i) Brahmin ( ) ii) Chhetri ( ) iii) Magar ( ) iv) Other( )

f) Occupation:

i) Agriculture( ) ii)Business( ) iii)Services( ) iv) Labor ( ) v) Other( )

g) Education Level.....

h) Religion:

i) Hindu ( ) ii)Buddhist( ) iii) Other ( )

Objective-1

To study the socio-economic and environmental impact of siudigadh micro-hydropower project.

1. Which is the main sources of Energy in your family?

   i) Traditional energy

   Fuel wood ( ) animal waste ( ) other ( )

   ii) Alternative energy

   Bio-gas ( ) Electricity ( ) Solar home system ( )

2. Have your living standard been changed after electricity?

   Changed ( ) Not changed ( ) Neutral

3. What is the status of your family income after having electricity?

   i) Increased ( ) ii)Decreased ( ) iii)No changed ( )

4. What Kind of change occurred on your health after the project being implemented?

   i)Positive ( ) ii) Negative ( ) iii) No change ( )

5. Is there irrigation facility in your farm? Yes ( ) No ( )

6. Is the project affected to drinking water supplies? Yes ( ) No ( ) Unknown ( )

7. What is the educational status of your children after electricity facilities? i) Improved ( ) ii) Not Improved ( ) iii) Unknown ( )

8. Have you felt any environmental degradation after the establishment of this hydro power?

   i) yes ( ) ii) no ( )

Objectives-2

To find out the attitude of community people towards siudigadh micro hydro-power project.

1. what effects have you felt in social and cultural aspects after this project?

i) Negative ( ) ii) Positive ( )

2. What are the affect have been occourred in the livelihood from thes project?

   i) change in business ( ) ii) change in agriculture ( ) iii)change in health ( ) iv) no change ( )

3. Are you satisfied with this micro hydro project?

   i) Satisfied ( ) ii) unsatisfied (

4. What sorts of effects have been occurred in the health aspects of community people?

   i) Positive ( ) ii) Negative ( )

5. What is the attitude of women for the utilization of electricity?

   i) Positive ( ) ii) Negative ( )

6. What is your attitude towards this hydro power project ?

   i) positive ( ) ii) negative ( )

7. Does your micro hydro power project affect the bio-diversity?

   i) Yes ii) No

Objective-3

To study the sustainability of micro hydro-power project in rural area.

1. Are you equally responsible for the sustainability of this hydro-power project?
   i)Yes ( ) ii) No( )

2. Do all the people of the community have proper access to use electricity?
   i) Yes( ) ii) No ( )

3. Under whose ownership is this Micro hydro project running?

   i) Community ( ) ii)NGO ( ) iii)INGO ( )iv) An individual ownership

4. Are there some skilled manpower to manage the project for its sustainability?

   i) Yes ( ) ii) No ( )

5. Is there an equal participation of both male and female for the sustainability of this hydro-power?

   i) Yes ( ) ii) No ( )

6. Who are the stakeholders of this micro hydro power project?

   i) VDC ( ) ii) DDC ( ) iii) Local government iv) All ( )

7. Is there any transparent policy made for the repairing and renovating if damaged?

   i) Yes ( ) ii) No ( )

8. Is electricity produced by this hydropower is utilized properly?
   i) Yes ( ) ii) No ( )

Key Informant Interview

1. When did you establish this micro hydro power?
2. What is the electricity producing capacity of this micro hydro power?
3. What sorts of plan and policy have you made for the sustainability of this hydro-power?
4. What challenges have faced for the sustainability of this hydro-project?
5. How many people are facilited by this hydro-power project?
6. Are there any misunderstandings or disputes created among the people regarding the distribution of electricity?
7. Who encouraged you to establish this micro hydro power project?
8. Where do you use the money collected from the consumers?