CHAPTER I

INTRODUCTION

1.1 Background of the Study

Small -hydro has multidimensional Changes and events on social cultural as well economic dimension of society. It empowers various possibilities of different dimensional changes and enabled social cultural transformation. The enormous investments and widespread Changes of large dams have seen conflicts flare up over the siting and Changes of dams - both those in place and those on the drawing board, making large dams one of the most hotly contested issues in sustainable (Tiwari, 2010).

Available of electricity in the rural areas most of the people buy TV. as well as other electrical instruments which leads cultural changes in the society. Electronic media also increase due to micro hydro power which ultimately increases social awareness. Use of fire wood also decreases due to availability of electricity which helps to better impact in the environment. Students also benefited due to electric light. Use of computer also increases in the rural areas (Dahal & Shrestha, 2014).

Micro hydro takes Social change which can be taken as evolve from a number of different sources, including contact with other societies and help to settle unemployed population in the village areas. Social change is also spurred by ideological, economic, and political movements.

According James (2001) the fundamental allegations that occur overtime a patterns of culture structure and social behaviour as social change." Available of electricity in the rural areas most of the people buy TV. as well as other electrical instruments which leads cultural changes in the society. Electronic media also increase due to micro hydro power which ultimately increases social awareness. Use of fire wood also decreases due to availability of electricity which helps to better impact in the environment. Students also benefited due to electric light. Use of computer also increases in the rural areas. Electric Rice mill also established in the village area (Tiwari, 2010).

The major energy sources of Nepal are forest organic matter, petroleum products, hydro electricity and coal. Other alternative energy sources are wind, solar and biogas, which are gradually being used. However, Nepalese energy sector is dominated by traditional sources of energy such as firewood, agriculture residue and animal dung. The process of converting the solar energy into electricity and other kind if energy in order to meet the need of modern industry, transport, household activities and other , in general, has been found to be very costly. The Small Hydro Development Border (SHDB) was formed in 1975 AD to implement small hydro installation in remote areas, particularly, at district headquarters. It was unable to fulfill it's ambitious 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 small hydro projects.

1.2 Statement of the Problem

Nepalese economy is based in traditional agriculture. In addition to agriculture, other sectors of economy such as industry, trade and commerce, transportation, communication and tourism have not yet been development fully due to the inadequate electric power and financial resources. In the absence of infrastructures like road and hydropower transmission, development cannot take place(Dahal & Shrestha, 2014). Moreover, infrastructures are required for proper exploitation of other available resources in the country. In short, economic development and growth has not accelerated due to the insufficiency of electricity.

Majority of Nepalese people live in the rural areas. Nepal has around 85 percent of rural population. However, the national electrification rate is just 39.4 percent. Out of this 80 percent are in cities. This shows that a huge population of Nepal is deprived of the electrical energy. The energy plays a vital role in daily activities and the fuel wood and solar energy are the major energy sources in the rural Nepal. Electricity comes as secondary sources of energy in the rural areas. It is the importance to note that a major share of rural life is spent is controlling and gathering fuel wood to meet energy. Thus,

absence of electricity implies more dependence on fuel wood and consequently has relationship with deforestation. Though Nepal has technically and economically feasible power generation capacity of 42,000 MW, she has utilized only 0.7 percent of it. The process of generating electricity is capital-intensive technology and Nepalese banks cannot finance project of more then 100 MW due to their capital constraints. As a result, hydro plants can act as an alternative means for the rural electrification (Tiwari, 2010).

The source of water is often insufficient during the dry season to generate electricity in full capacity and small dams are affected by flood in rainy season. Though the technology is simple there is the problem for reparation. The plant cannot be repaired without technicians' assistance. On the other hand, hydropower can fulfill the demand if electricity in backward and isolated rural areas where disadvantaged and marginalized people live. Indeed, micro hydropower projects have not been installed in adequate number in targeted areas yet. The marginalized people are living in remote rural areas that lack balance of regional development. Limited research will be conducted on social-economic impacts of small hydropower projects. However there are many studies in other sector of hydropower project. 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 publications, reports these dissertations articles on journals newspapers which are related to the hydropower are reviewed in the thesis. Therefore, I'm interested to conduct research under economic impact of Bhirgu Khola small-hydropower of Sanfebagar Municipality -11. The development in such rural areas, to a large extent, has not been achieved in the absence of the electricity, and the following has the research questions arise:

1 What is the economic impact of Bhirgu Khola small-hydro power project in local people?
2 What is the sustainability of small-hydro power project in rural area?

1.3 Objectives of the Study

Objective of the study is to evaluate the economic impact of micro-hydro power in Sanfebagar Municipality,Ward No-11, Achham District, Nepal. Besides this, study has following major objectives. Specific objectives of the study are as follows:

3 To study the economic impact of Bhirgu Khola small-hydro power project in local people.

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

4.4 Significance of the Study

Electricity can significantly diversify rural activities. The electricity can raise the living standard of people. Advantages of electricity are electricity makes human life easier by providing domestic as well as non-domestic facilities. Establishment of large, middle, small and cottage industries as a result creates employment opportunities. In the presence of electricity electronic devices may be available. They improve both quality and quantity of communication and education. Electricity helps discover, develop, expand and promote new techniques and technologies in various sectors. It helps develop infrastructures that are precondition for the economic development. In fact there is correlation between development and electricity. Improvement in extracurricular activities, which help raise the living standard of the people. It helps improve overall sectors of the economy.

1.5 Limitation of the Study

The research was conducted to analyze the impact of hydropower project on economic condition who live in the Sanfebagar Municipality, Ward No-11 , Achham District, Nepal. This study was confine in the limitations.

It was the case study of Sanfebagar Municipality,Ward No-11, Achham District of the country. Future study may require the frequent visit which cannot be affordable due to the lack of budget. The future study was generate the primary data which was the original but sample size was limited which outcomes may not be similar as national level.

CHAPTER – II

LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Modernization Theory

The term modernization theory refers to a theory which states that development in developing worlds can be attained through following the processes of development that are used by currently developed nations(Rostow, 1960). It is a social economic theory which is sometimes known as the development theory. It usually highlights the positive role played by those countries that are developed in modernizing and facilitating sustainable development in those countries that are less developed and it often contrasted to dependency theory. This means that for development to occur in underdeveloped countries there is need for developed countries provide aid to developing countries to enable them learn from their own progress. It looks at the state to be the central actor in bringing about modernization in societies that are backward. The theory also believes that underdeveloped countries could grow faster than developed countries and catch up and that it was possible for equal development to be reached between the underdeveloped and developed countries (Hollis & Robinson, 1986).

Therefore Walt Rostow postulated a five stage model of development that will be able to apply to all the countries. This model was vital in the sense that it is concerned with the idea that a country is able to develop economically by focusing on the resources that are in short supply in order to expand beyond local industries to reach global market and finance the country's further development to bring about economic growth (Todaro & Smith, 2003).

The first stage is known as the Tradional Society which is associated with the country that has not yet developed but the majority of the people are engaged in subsistence agriculture and more investments are channeled in services or activities such as military and religion. It is important to understand that this stage of development is concerned

with societies that have a pre scientific understanding of gadgets (Hollis, 1979).This means that the society that the people in such a society are in a condition of fatalism and denies that people could change their living condition because their minds are magical, mystical and non-historical in the sense that they will not be able to dig to find out how to change or improve their wellbeing. They believe that things such as goods come into being by divine forces rather than the intervention of man or ingenuity. It does not mean that the economy's production level of such a society is static but is increased due to the surplus cultivation of the land in order to increase agriculture production (Rostow, 1960).

It is also important to understand that the states as well as the farmers in traditional society are aware of the various irrigation methods and the expansions in order to improve agricultural output levels. This means that in traditional society consists of some technological innovations but only exists in ad hoc basis that is for a particular purpose (Todaro & Smith, 2003).

There have always been a barrier in traditional society which could not be crossed or overcome and this was due to lack of knowledge or application and constant development of modern science and technology.

Rostow (1960) explains that trade is also usually done using barter system and that the systems of monetary are not developed hence the investment levels are less than 5% in traditional society. There is also a challenge in the changes of the size of population, quality of life or the social economic development because of the wars, famines due to crop failures, earthquakes, and epidemics such as plague and trade fluctuations due to trade stability or instability.

The manufacturing sector and industries in traditional society had a tendency to grow but had always been limited by the inadequate scientific knowledge and backward frame of the minds which resulted into low labour productivity (Carmody, 2004).There is also massive concentration of political power in the hands of land owners and the social structure is feudalistic in nature.

The second stage of development or economic growth is called the pre-condition for takeoff whose economy undergoes a process of change for building up of conditions for growth and takes off.

Rostow (1960) asserts that the changes in this stage the society and the economy are fundamental in nature in the socio political structure and production technique. It is characterized by the massive development of mining industries, increase in capital use in agriculture, necessity of external funding and some growth in savings and investments. It also consists of certain dimensions that are associated with this transition from traditional society through the conditions to the takeoff phase. For example there is a shift from agrarian to industrial or manufacturing society, trade and other commercial activities are broadened to reach not only local markets but also international markets and there is no wasteful of resources or the surplus attained by the land owners is used to develop industries, infrastructure and preparation of self-sustained growth or development (Hollis & Robinson,1986).

It is the stage in which agriculture is commercialized and mechanized to bring about technological advancement and growth in entrepreneurship activities. The main focus of this stage is to ensure that investment levels are above 5% of the national income depending on various sectors of the economy. The agricultural activities play an important role in the process of transition or development.

The third stage is called the take off stage of development which is sometimes called the economic take off. It is characterized by dynamic economic growth which is due to sharp stimulus of economic, political or technological in nature. The main focus of this stage is the aspect of self-sustained growth. It is also referred to be an interval when the old blocks and resistance to steady growth have been removed (Rostow, 1953).

It is important to understand that this stage occurs whenever the sector led growth becomes common and society is driven more by economic processes than traditions. The growth or economic progress becomes a normal trend or situation in these societies because those factors that were affecting or limiting growth are removed. There is an increase in industrialization, further growth in savings and investments and there is a

decline in the number of employees in agriculture and there is an increase in entrepreneurship (Hollis & Robinson, 1986).It is also important to understand that once take off has taken place a country will take as long as fifty to one hundred years to reach maturity as was the case with the industrial revolution.

The fourth stage after the take off stage is the drive to maturity which is concerned with the extension of modern technology over other sectors of the economy or society. Drive to maturity stage refers to the period when a country has affectively applied the range of modern technology to the bulk of its resources (Rostow,1953).

In this stage growth becomes self-sustaining in the sense that wealth generation activities enables further investment in value adding industry and development. It is important to understand that during this stage the economy finds its place in the international economy and those goods that were imported begin to be produced locally and new requirements for import are developed (Todaro & Smith, 2003).

It is generally an improvement on the takeoff whose economy focused relatively on narrow complex of industry and technology and the economy of the maturity stage extends its range into a more refined and technologically often more complex processes.

The fifth and final stage is called the age of high mass consumption were the leading sectors in the society shift towards durable consumers goods and services. The consumers focus on durable goods and hardly remember the subsistence activities of other stages. Preston (1988) asserts that this stage is concerned with the high output levels, mass consumption of consumer durables and increase in employment in the service sectors. It is characterized by an increase in per capita income, changes in the structure of the working force including those working in the offices or factories and an increase in the desire to benefit from the consumption fruits of a mature economy.

Gustav (1964) adds that due to the economic changes the society ceases to accept further extension of modern technology as an overriding objective but increases allocation to other social activities. In this age of high mass consumption the society is able to choose between concentrating on military and security issues, on equality and welfare issues or

developing luxuries for its upper class. It is important to understand that each country in this state of position chooses its own balance between these goals. There is a desire to develop an egalitarian society and that the country in this stage seeks to determine its uniqueness and the factors that are affecting it are political, geographical and cultural structures and also values present in its society.

It is therefore true to say that education has an important and direct relationship to addressing of each of the five stages of modernization theory or economic development in any given society or country (Carmody, 2004).This means that education plays an important role in the five stages of economic growth propounded by Walt Rostow in order to bring about desired development. For example in the Traditional society education is vital as it helps people to acquire better ways and methods of farming in order to enhance agricultural activities. This is possible because traditional society is associated with massive subsistence farming activities. Through education the people who live in a traditional society are able to acquire different methods of irrigation and measures that can be taken in order to sustain the life of human beings and life of crops or vegetation and also to be able to have the knowledge of family planning in order to regulate the size of population (Rostow, 1960).They are able to understand the value of their mindset, rights and their role in development.

In the second stage of pre-conditions education helps people to be aware of the political aspects of society and that there are other ways of investments such as industry and manufacturing rather than farming life which is associated with traditional society. Education is vital in this stage as it helps people to acquire the knowledge about the importance of engaging in international market in order to enhance the investment levels. It also inculcates new values and attitudes in the people and also to allow them learn how to manage their resources.

Education also plays a role an important role in the take off stage in the sense that it enables people in the society to be able to have proper access to science and technology as well as the acquisition of values which predispose a population to change (Carmody 2004) This is because science and technology are the dynamic values of the education

and it is achieved through learning that takes place in various schools of a particular society. It also helps people to acquire the knowledge of entrepreneurship and production in order to increase the workforce in the society.

It also important in the maturity stage of development because it helps to extend the knowledge and skills of technology to other sectors of society and this is usually achieved through workshops, seminars and lecture methods. Farmers can be called for a workshop in order to educate and extend the new knowledge of technology and how to sustain the economy or production of output levels.

It also plays an important role in the sense that it enables people to be aware of their rights and opportunities in the society. For example people are able to know that they are equal and are supposed to be treated fairly and equally regardless of sex or status in the society. It also helps the society to prioritize their goals or objectives into those that need urgent attention in order to satisfy the desires of the people. It enables skills and resource sustainability in the people.

Rostows stages of economic development are very important in the sense that every society supposed to go through all the five stages of development. These stages or transition periods happen at varying lengths from country to country and even from region to region. They are important in the sense that they foster economic self-reliance for the development of all sectors to bring about modernization. Education is also considered to be a pre requisite of the development of any society.

2.2 Community Development

Community development is a road travelling by both governments and development agencies was introduced during post World War II. It is concentrated into macro level micro level of community has achieved it in support of macro social institution and initiation of micro community organization (CRWRC, 2004). It is community based development project is an umbrella term that actively include beneficiaries in their design and management (Mansuri & Rao, 2004).

Community development is a solution of social problem which interacts with institutions, communities, and society at-large (Tan, 2009). It based on mobilization of common property (local recourses) and synchronizes the cooperation, coordination through action and interaction held between different actors of society. It ties up different institutional and individual relation into the principle standard of equal benefit sharing (Chamber, 1993). After introducing of the decentralization Act 1987 the concept of "user groups" as well as user committee for local control of local resource management and development. So, MHP based on common property is started to form, operate and manage by local people themselves since 1996 (AEPC, 2000).

The approach was a strategy to strengthen the development discourse in specific form and pattern. It had adopted the strategy of both top to down and bottom up approach in development discourse; however, both strategies are reverse to each other. Concept of community development is nothing but creation of each citizen's responsibility and participation in development activities (Meisel, 2006).

The core strategy since introducing of decentralized development concept, most of the community development are conducted through foreign aid. According to Mishra (2007) most of the foreign aid is articulated in infrastructural expansion. As a result the sector has gained an increasingly centralization and dependency characters (Mishra, 2007:165). However, the level and layer of centralization and dependency characters do not limit on particular. It has affects on macro, mezzo and micro level. Whereas it's depth might different. There are some evidence that community development project creates some infrastructures but most such projects are dominated by local elites, and both targeting and project quality tend to be more markedly worse more in unequal community (Mansuri & Rao, 2004).

Dams have been built for thousands of years - dams to manage flood waters, to harness water as hydropower, to supply water to drink or for industry, or to irrigate fields. By 1950, governments, or in some countries the private sector, were building increasing numbers of dams as populations increased and national economies grew. At least 45 000 large dams have been built as

a response to meet an energy or water need. Today nearly half of the world's

rivers have at least one large dam. (Dams & Development: 2000)

As we start the new century, one-third of the countries in the world rely on hydropower for more than half their electricity supply, and large dams generate 19% of electricity overall. Half the world's large dams were built exclusively or primarily for irrigation, and some 30-40% of the 271 million hectares irrigated worldwide rely on dams. Dams have been promoted as an

Important means of meeting perceived needs for water and energy services and as long-term, strategic investments with the ability to deliver multiple benefits. Some of these additional benefits are typical of all large publicinfrastructure projects, while others are unique to dams and specific to particular projects. (Dams & Development: 2000)

Regional development, job creation, and fostering an industry base with export capability are most often cited as additional considerations for building large dams. Other goals include creating income from export earnings, either through direct sales of electricity or by selling cash crops or processed products from electricity-intensive industry such as aluminium refining. Clearly, dams can play an important role in meeting people's needs. But the last 50 years have also highlighted the performance and the social and environmental Changess of large dams. They have fragmented and transformed the world's rivers, while global estimates suggest that 40-80

Million people have been displaced by reservoirs. As the basis for decision-making has become more open, inclusive and ntransparent in many countries, the decision to build a large dam has been increasingly contested, to the point where the future of large dam-building in many countries is in question.The enormous investments and widespread Changess of large dams have seen conflicts flare up over the siting and Changess of large dams - both those in place and those on the drawing board, making large dams one of the most hotly contested issues in sustainable development today. (Dams & Development: 2000).

2.2 Empirical Review

'The post-World War II (Post 1950s) molded the product of development. It was institutionalized as Jeffry (1990) said to legitimize the hegemony campaign initiated particularly by USA. Many technical and financial grant supports were provided for the provision and still in continuation. For example it could be still seen getting grant and technical support such as in community forest management programme, community health programme, and community based micro hydropower projects too.

Ferguson (1990) has characterized development project as contradictory endeavor because it is not a progressive force but the reactionary one for marginalized society. It is strategy of colonization that colonizes the different level of society into single petty state at local level. As Frank (1968) said, development is a discourse of categorizing society into different category (macro level) then it could also be the strategy to social categorization at local level (micro level) too. Almost community development project are focused into those community, which are introduced as undeveloped society and actors of this course are not other than the local elites of different institutions (Frank, 1968).

Political factors are that which plays decisive and dynamic role for change (growth). Political ideology helps to promote those factors to be dominant in development in different level of society. Development defined and applied through different approaches aim ultimately to transform the different institution (economic. political and others) society from existing one to another level and forms as well.

Development is that tasks which enables to different elite as actors control the society and its different institutions in different level through its different development organizations. The whole course of development is to maintain hegemony in different level of society applying different forms, level through different strategies and approaches. It has applied different approaches and strategies (participatory approach) to control the society but the result has promoted challenges for real development society whether level of society is matter where it is (Portes, 1990).

Hydropower schemes must have significant role in poverty alleviation, and raise the economic standard of the society. Electricity approach, children and woman empowerment and the infrastructure development are the positively influencing factors for making the society beneficial such as fresh drinking water and irrigation water, flood control, fishing profession development has convinced the people on the positive side of hydropower development in Nepal and many places have seen the uplifting of the overall social status. These Changess were mitigated by offering the cash compensation for those who lost their land, house and property. Alternative indirect mitigation measures were also taken in the projects including the rehabilitation of the affected families, providing thereplacement land and house and providing the job in the project according to their skill and qualification. This is the trend in Nepal and till today almost all the displaced people are rehabilitated. (Dahal and Shrestha : 2014)

Mostly proactive during the planning phase, the element involves the following considerations to ensure the sustainability of the project:

- Improved life conditions
- Improved health conditions
- Direct or indirect project benefits distributions
- Information and economics transparency (Dahal and Shrestha : 2014)

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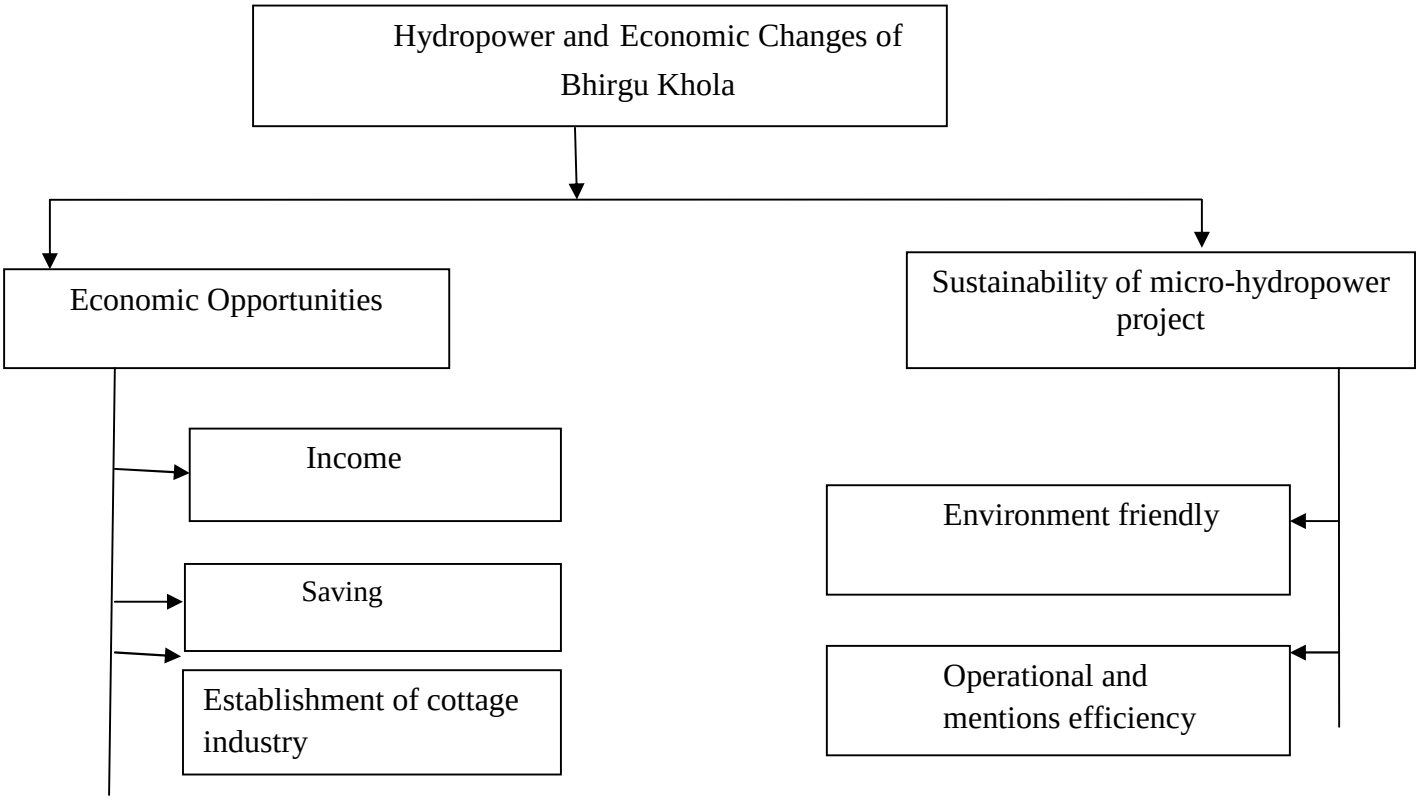
The approach was a strategy to strengthen the development discourse in specific form and pattern. It had adopted the strategy of both top to down and bottom up approach in development discourse; however, both strategies are reverse to each other. Concept

2.3 Conceptual Framework

On the basis of the above literature review following conceptual review can be operationalized.



CHAPTER III

RESEARCH METHODOLOGY

Basically, research is described as an active diligent and systematic process of inquiry aimed of discovering, interpreting and revising facts. The term research is also used to describe a collection of information about a particular subject too. So, the application of procedure for research is known to be research methodology. One can also define research as a scientific and systematic search for pertinent information on a specific topic (Kothari, 1989).

3.1 Research Design

A research design is the logical and systematic planning and direction of a piece of research. The research design is a plan of study or blueprint for study that presents a series of guideposts to enable the research to progress in the right direction in order to achieve the goal. In the study, descriptive and analytical research design has adopted.

Descriptive research design has used mainly for conceptualization of the research objectives and research problem of the study. This study has facilitated a long discussion with interacting clients regarding the empowerment of women through cooperative. Present researcher has used to analyze the collected data and information more accurately and critically.

3.2 Area Selection

The study was conducted in Sanfebagar Municipality -11.of Bhirgu Khola micro-hydropower project Accham District. The districts is selected as to provide the feathers of neither develop nor very backward. The high ethnic diversity represented by these ward no -11 of the Sanfebagar Municipality also is one of the motivating factors for conducting the present research work. One of the many reasons for carrying out the research work is my familiary with Sanfebagar Municipality is selected being my home district to which I am familar with place and people.

3.3 Nature and Sources of Data

This study aims to study explicate the utilization of hydro power and economic impact of Bhirgu Khola small hydropower project of Sanfebagar Municipality -11. So, this study was basing on qualitative from questionnaire through household interview survey. Thus the primary data has collected from user and non-user households of the study area.

3.4 Universe and Sampling

There are 576 household in Sanfebagar Municipality -11.of Bhirgu Khola micro-hydropower project. Out of total 54 household was pick up for the sample according to

the *tole* wise user households ratio by using simple random sampling to fill the purpose of the study. This is based on the information collected from the sample household, selected simple random sampling method.

3.5 Data Collection Tools and Techniques

For this study, data about the effectiveness of the electrification has collect through direct proposal interviews with the help of structure questionnaire among directly project. Affect families (PAFs) in the society since the installation of Bhirgu Khola small hydropower project of Sanfebagar Municipality -11. The questionnaire and interview method has apply to collect the both qualitative and quantitative data in the survey.

3.5.1 Questionnaire

To generate the accurate data from household survey of micro-hydro users, structure questionnaire was prepared. The respondent will require to fill questionnaire find out the respondents attitude the impact of MHP in different sector in the village the question was provide them to fulfill in their own views.

3.6 Data Analysis

A work sheet was prepared through the complete questionnaire incorporating the use of electricity for the purpose. The collect data was classify according to its nature and characters. To make the analysis more reliable and easier different data sheet will prepare for different variable. Field questionnaire was carefully check for possible errors. The

data will carefully edit and process by computer programmer state and excel the require pie-chart, bar diagram and table was generate by using computer software program

The data was tabulate and analyze according to the objective of the study. The data analysis was descriptive as well as analytical. Data will analyze with the help of computer programmers strata and excel. Simple statistical tools like tables, pie chart was used for analysis. Descriptive method was use for qualitative data.

The collected data was edited, coded, classified and tabulated in generally accepted from; Microsoft Excel and other useful programs were used to process the data in computer. The processed data exhibit an appropriate. Result of the situation in the District.

The field base data and information was collected the rough the survey were analyzed by using various statistical methods according to the need and nature of data. As per the requirement of study, mainly table, charts, diagram etc. was used. The data were analyzed through descriptive method. As for primary data, field survey was conducted using both structured and unstructured data prepared prior to the field visit. Questionnaire was filled with the sampled research among respondents.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

This chapter deals with data presentation and analysis, which includes current status of Micro-hydropower development in Nepal, it's economic analysis and impact of SHP project in accessing education, health, Households consumption on electrical goods, benefits of SHP, income, employment and entrepreneurship of the people who live in Sanfebazar-11. Socio-economic feature of the study area depicts the development status of the village with the aspect of sociologically and economically. The sociological and economic characteristics such as General information of sample households (religion, age, cast, gender etc.), household's participation by ward, education, employment, health, entrepreneurship, rural electrification and level of income have a significance influence in the economy of the village and the living standard of the people. Similarly electrical goods consumed by sample household and benefits of SHP deals with the household consumed number of electrical goods and benefits from SHP due to consumption of electrical goods after SHP project such as improvement in communication , skill development etc.

4.1 Cast and Religion of Sample Households

Nepalese people are categories in to a different cast and ethnic groups. Cast system is fundamentally based on Hindu religion whereas vertical relationship among the cast exist. Janajati are in the apex whereas Dalit Group is the bottom of the socio economic class at the study areas.

Table No 4.1: Cast of the respondents

S.N	Cast	Respondents no	Percentage	C f %
1	Brahmin/Chhirti	13	24.07	100
2	Janjati	35	64.82	75.93
3	Dalit	6	11.11	11.11
Total		54	100	100

Source: Field survey, 2019

The above table depicts that the distribution of respondents by cast and ethnicity of the sample household. The highest portion 35(64.81%) respondents are Janajati lowest portion 6(11%) respondents are Dalit. Likewise, the moderate number of respondents 13(24.07) are Brahmin/ Chhitri.

4.2 Gender of the Respondents

There was significance imbalance in the participant respondents regarding gender. The population ratio of male and female are nearly 50-50 but female respondents were fewer in numbers than male numbers in this research because in many house hold male were head of the family and the society is patriarchal so male participation was larger number in compares to female number in this sampling process. Out of the total sample 79.62% were male respondents whereas only 20.37% were female. The gender wise participation of respondents of the study area has presented in table below.

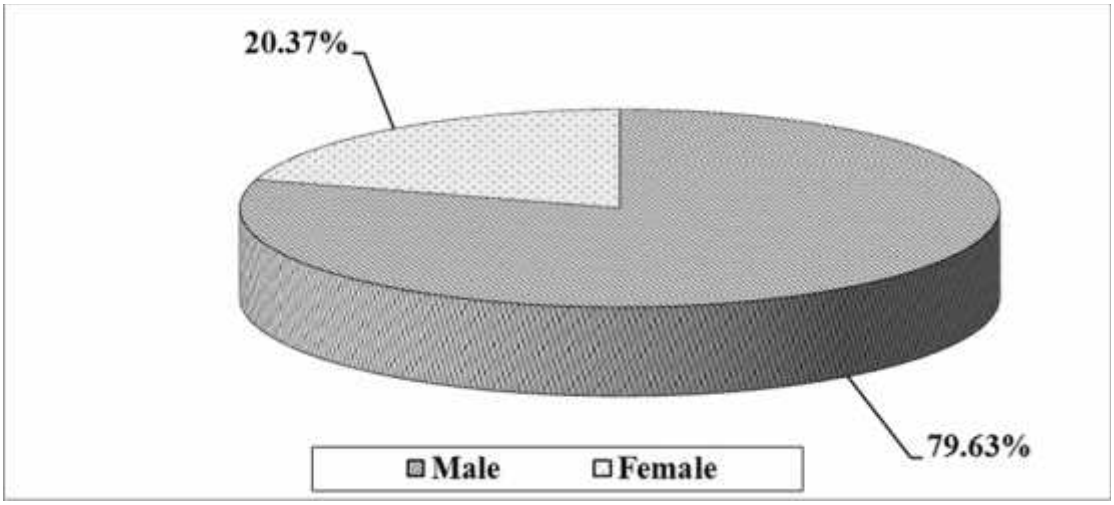
Table No 4.2: Gender of respondents

SN	Sample household	Percentage	C f %
Male	43	79.63	79.63
Female	11	20.37	100
Total	54	100	100

Source: Field survey, 2019

The above table shows that the gender of respondents of the sample households. Out of the total (43)79.63% were male respondents whereas (11)20.37% female. In the table cumulative frequencies also can be presented.

Figure: Gender of the respondents



The above figure illustrate that the gender of the sample households. In the above figure 20.37% were female respondents and 79.63% were male respondents.

4.3 SHP and Rural Electrification

81% respondents accepted that SHP plays the vital role to electrification in the rural areas. Before this project they compiled to live under the kerosene lamp light. If villagers were waiting to central grid, they may still in dark night. They have no easy access to get central grid due to the scatted settlement and topographical difficulties. Hence, SHP is the best energy sources for rural areas electrification. Thousands of big rivers and small rivers falling from mountain to plain areas, micro hydro project can easily lunch in low and reasonable cost in needed areas. Hence, it is the easy and chief way to provide electricity in remote areas of Nepal.

SHP effects on villagers in multidimensional ways like light, education, income, sanitation, health, employment, communication and technological improvement in the study areas. Most of the people use it for the purpose of lighting, which makes their night life easier, people get easy communication access and children's reading habits, life style have changed. Many small scale industries like agro -mill, furniture, saw mill, shop etc. makes people's life style easier than before. People's attitude and behavior have changed

by using the electrical instruments like radio, TV, internet and other various sources of media. SHP help to rural electrification or not can be shown below following tables and figure.

Table No 4.3: SHP help in rural electrification

SN	SHP help in rural electrification	Observation	Percentage	C f %
1	Strongly agree	25	46. 30	46.30
2	Neutral	0	0	46. 30
3	Disagree	3	5.56	51.85
4	Difficult to say	7	12.96	64.81
5	Agree	19	35.19	100
Total		54	100	100

Source: Field survey, 2019

The above table illustrates that how SHP help in rural electrification. Above table shows that the 25(46.30%) respondents were strongly agree as SHP help in rural electrification. Similarly, 0(0%), 3(5.56%), 7(12, 96%) and 19(35.19) sample households were netural, disagree, difficult to say and agree respectively. The highest portion of the respondents is agree SHP help in rural electrification.

The above figure shows that how SHP help in rural electrification. Figure illustrates that 25% sample households are strongly agreed as SHP help in rural electrification. Similarly 0, 3, 7 and 19 percentages respondents are neural, disagree, difficult to say and agree respectively. This implies those highest portions of sample household are agree SHP help in rural electrification so that we can say that SHP plays vital role in rural electrification.

4.4 Electricity Consumption for Various Purposes

People use the electricity mainly for lighting purpose; very nominal number of households used it for productive purpose like installation of Small-scale industries /firms. Due to the insufficient of power as public demand from SHP and so they are unable to lunch cottage industries as well as economic instruments, as they want to use. Even, they are compelled to run the installed firms in alternative time due to the in sufficient of power. Mainly, households used SHP for lighting purpose minimum 2 hrs.to

maximum 10 hrs. From 54 sample households, 34 house hold use the electricity for the purpose of business at the mean hours 5.7. They used electricity this purposes minimum 3 to maximum 15 hours per-day. For TV and Radio purposes, they used 1 to 7 hours at the mean hours 3.64 and 1 to 2 hours for personal used whereas in average 0.33 hours. They used for the purpose of cooking 1 to 4 hours at the mean 1.04 hours.

Table No 4.4: Electricity consumption per-day for various purposes

SN	Uses of SHP	Sample Household	Mean Hrs.	Std. Dev.	Min.Hrs.	Max. Hrs.
1	Lighting	54	4.96	1.5	2	10
2	TV/Radio	51	3.64	1.70	1	7
3	Business	34	5.27	4.12	3	15
4	Personal uses	14	0.33	0.54	1	2
5	Cooking	37	1.04	0.99	1	4
Total		190	15.24	8.87	8	38

Source: Field survey, 2019

The above table presents the electricity consumption per-per day for various purposes. In the above table 54 sample households are consume electricity per day for lighting purposes at the 4.96 mean hours and their standard deviation ,minimum hours and maximum hours are 1.5,2 and 10 hours respectively. Similarly electricity consumption per-day for TV/Radio, Business, Personal uses and cooking purposes sample households are 51,34,14 and 37 respectively and these sample households using electricity for TV/Radio, Business, personal uses and cooking purposes at the mean hours per-day 3.64,5.27,0.33,1.04, standard deviation are 1.70,4.12,0.54,0.99, minimum hours are 1,3,1,1, and maximum hours are 7,15,2,4 respectively.

4.5 Impact on Education

The hydropower project may have vital on the education of the children as well as adult. With the availability of light, children can study additional time hours, which may improve their performance in school. Similarly, parents are more aware to their children's education which also helps to uplift the academic performance of the children. By asking

the improvement of their performance at Scholl, participation on any type of literacy class at night and study hours of the children after SHP are taken as the measuring rod of impact of SHP project on education sector. People are aware of the importance of education for women because of the use of TV and other instruction. Now girl go to Scholl in the large number But as far as higher education is concerned local people are still backward. Some people are started to send their children to boarding school. Some women have taken skill oriented training.

4.6 Effect on Children's Study Habits after SHP

After SHP, the study habits of the children have raised. 88% household agreed (strongly, to some extent and agree) that the performance of the children has improved in the school than before. In the rural sector, in the absence of electricity, the student or children are obliged to use kerosene lamp while studying in evening and night time. By this situation schooling aged generation is mostly affected. They cannot study for long time due to the deficiency of enough kerosene and deem light.

Table No 4.5: SHP Effect on Children's Study

SN	Increased hours(in a day)	Household	Percentages	C f %
1	Less than one Hours	12	22.22	22.22
2	One to two hours	6	11.11	33.33
3	Two to three hours	4	7.41	40.74
4	More than three hours	22	40.74	81.48
5	Un known	4	7.41	88.89
6	Decreased	6	11.11	100
Total		54	100	100

Source: Field survey, 2019

The above table illustrate that the out of total 54 sample, 12(22.22%) households children raised their study time less than one hours, 6(11.11%) households children study hours raised 1 to 2 hours, 4(7.41%) households children's study hours increased 2 to 3hours, similarly 22(40.74%), 4(7.41%) and 6(11.11%) households children's study hours are increased more than three hours, unknown and decreased respectively. Hence, most of

the guardian of the schooling children found that their children have been studying at the night time using electricity by this situation, it can be said that most of the students educational status is improved after electricity.

4.7 Educational Status of Family Member

The literacy rate of the project affected families is 59.71% male and female. However after the project only 40% male and female are literate. This means project help to promote the educational status in the project affected areas.

Table No 4.6: Educational status of family member

SN	Educational status	After project Literate				
		Male	Female	Total	%	C f %
1	After project	152	100	252	59.71564	59.71564
2	Before Project	103	67	170	40.28436	100
Total		255	167	422	100	100

Source: Field survey, 2019

The above table depicts that the educational status of the respondents family. After the project install 9.70% male and female are literate in comparing to before the project. It means we can say that, the rate of literacy at the project affected areas is increasing gradually. After the project 152 and 100 male and female are literate respectively. Before the project the male and female literate are 103 and 67 respectively.

Table No 4.7 Peoples participation on any literacy class at night

SN	Literacy class	Observation	Percentage	C f %
1	Not conduct	21	38.89	38.89
2	Adult	12	22.22	61.11
3	Women	21	38.89	100
Total		54	100	100

Source: Field survey, 2019

The Above table shows that after the SHP project 12(22.22%) households participation on Adult literacy class at night and 21(38.88%) households are participate on women literacy class at night. However 21(38.88%) household are not conducting or participate on any literacy class at night. This means large number of sample households is participate at literacy class at night. Therefore the SHP plays the vital role to uplift literacy rate by providing electricity.

4.8 Impact on Health and Sanitation

People are conscious of their health and sanitation. They started to visit clinics and hospitals instead consulting with witch doctor (Dhami, Jotish, and Jhankari). Mothers have learnt how to take care their child. Most of the people make a puckki toilet. Smoke from firewood and kerosene had made the health condition of the people poor in village. Staying in front of firewood for long time caused the housekeepers health worse and children's health also damaged by kerosene used as a means of light to read. Indoor air pollution could lead the serious health problem such as respiratory diseases and eye inflection. Having micro hydro electricity supply at home reduces indoor air pollution by decreasing the use of kerosene and firewood, which lessen the risk of respiratory diseases and eye inflection. By using electrical instrument, people have been listening and watching about health tips and educational programs, which help to change their health condition and they tend to use fresh and healthy things. The expenditure on treatment has reduced and the saving amount can use in others productive purposes. Thus, SHP has impact on multi-dimensional ways; it helps to uplift the living standard of the people in village.

People must be careful about indoor and outdoor sanitation. In the negligence of sanitation there may happen different kinds of problems. Human health has been risky without sanitation after using modern electrical instruments. During the survey time of the project the aid organization has lunch the awareness programs about sanitation in the village and every household had compulsion to build toilet before the completion of the project. Oyakjung also declared as the 'Khula Disa Muktha VDC'. By using electrical instruments of the people have changed and they began to care indoor and outdoor

sanitation. In the negligence of sanitation there may happen different kinds of problems. After this SHP, 100% said that the village become neat and clean than before.

4.9 Benefits on health condition after and before installation

To estimate the impact of, each individual of a household was asked whether they had suffered from diseases such Asthma, Bronchitis, ENT irritation, eye infection other diseases after and before the project. A list of these diseases along with the percentage of individual participation about these diseases after and before the project installs have been presented in the following table and figure below.

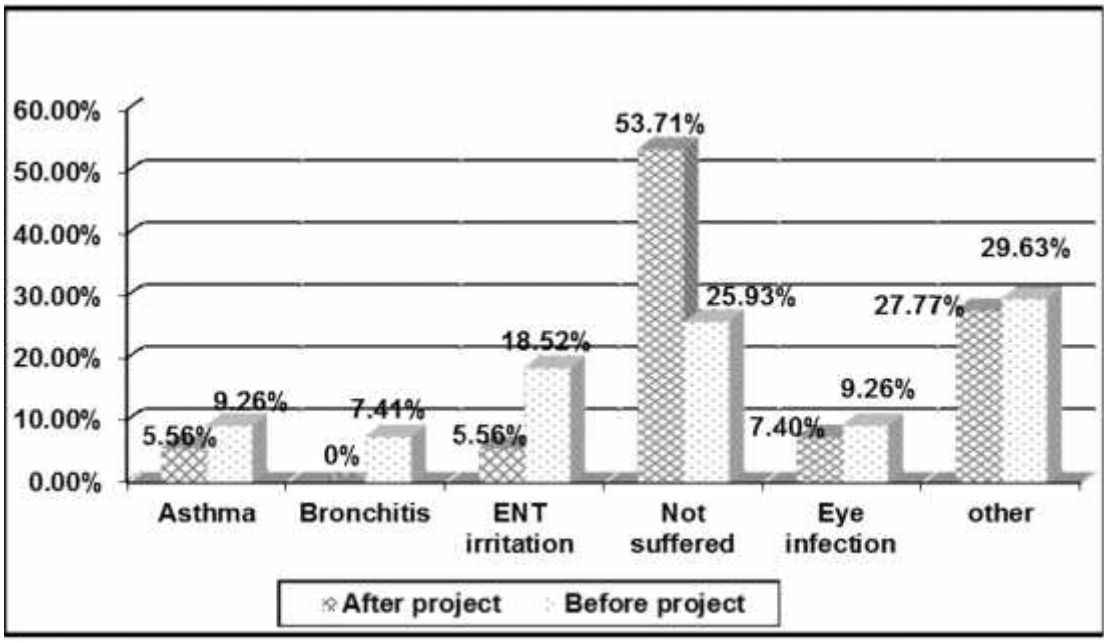
Table No 4.8: Sample Households suffer diseases

SN	Diseases	AP suffered household	AP %	BP suffered household	BP %	CF% AP	CF% BP
1	Asthma	3	5.56	5	9.26	5.56	9.26
2	Bronchitis	0	0	4	7.41	5.56	16.67
3	ENT irritation	3	5.56	10	18.52	11.11	35.19
4	Not suffer	29	53.70	14	25.93	64.81	61.11
5	Eye infection	4	7.41	5	9.26	72.22	70.37
6	Other	15	27.78	16	29.63	100	100
Total		54	100	54	100	100	100

Source: Field survey, 2019

After lunch the SHP project the ratio of suffering from any type of diseases were decreases. Out of the total sample, only 3(5.5%) households are suffering from Asthma, but suffering from Bronchitis is almost nil or zero in the sample households. Likewise, 3(5.56%), 29(53.70%), 4(7.41%) and 15(27.78%) were suffered from ENT irritation, eye inflection and other diseases respectively. However, before the project suffering ratio from any kinds of diseases household were higher in comparing to after the project suffered household. The above table depicts that before the project 5(9.26%), 4(7.41), 10(18.52%), 14(25.93%), 5(9.26) and 16(29.62%) households were suffered from Asthma, Bronchitis, ENT irritation, Not suffer, Eye inflection and other diseases respectively.

Figure No: Sample households suffer diseases



The above figure illustrate that the percentage of suffering from different kinds of diseases after and before SHP project installation. The above figure shows that after the project 5.56% sample households suffering from asthma. Likewise, 0%, 5.56%, 53, 7.41% and 27.79% sample households suffering from bronchitis, ENT irritation, not suffering eye infection and other diseases after the SHP project installation. However the 9.26%, 7.41, 18.52, 25.93, 9.26 and 29.63% respondents were reported that they were suffering from Asthma, bronchist, ENT irritation, not suffering, eye infection and other diseases before the SHP project installation. This means the sample households suffering from any kinds of diseases after the SHP project installation were decreases in comparison to before the SHP project. This implies that SHP project plays vital role in order to control diseases by providing health information to the sample households from different ways.

4.10 Changes in Children Daily Activities by using Electronic Instrument (TV, Moobile, Computer, Radio)

The uses of electrical instruments have caused multiple changes on children's behaviors. Almost all the children of the project effected area and got positive changes and learn many things by watching TV or using computer except some negative outcomes such as watching TV for long time, play game in computer/mobile for long time etc. We asked to the respondents in a different ways to know about what is the condition of the children's activities after MPH project.

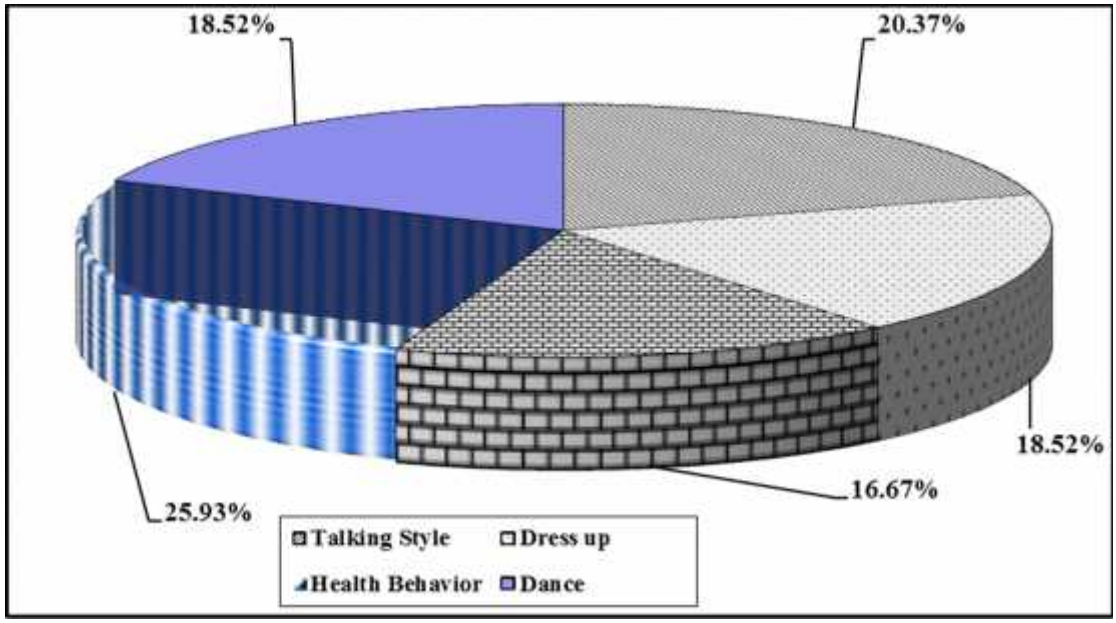
Table No 4.9: Changes the activity of the children after the MPH installation

SN	Changes Activity	Sample households	%	C f %
1	Talking Style	11	20.37	20.37
2	Dress up	10	18.52	38.89
3	Sports	9	16.67	55.56
4	Health Behavior	14	25.93	81.49
5	Dance	10	18.52	100
Total		54	100	100

Source: Field survey, 2019

The above table illustrates that, the activity of the children after the SHP install. Out of total sample, 11 (20.37%), 10 (18.52%), 9 (16.67%), 14 (25.93%) and 10 (18.52%) respondents were reported that after SHP the children talking style, Dress up, sports, health behavior and dance activities was changed respectively

Figure: Activity of the children after the SHP project installation



The above figure indicates that the activity of the children's after SHP project. Figure shows that the 20.37%, 18.52%, 16.67%, 25.92% and 18.52% sample households reported their children's talking style, dress up, sports, health behavior and dancing activity were changes after the SHP project respectively. This implies that SHP project has significant role in order to change ample household's children's positive activities.

4.11 Impact on Income, Employment and Expenditure

Agriculture, livestock husbandry, wage labor business, services, industries/firms and foreign employment are major sources of income of project affected people before and after the project install. However, the income earnings from these sources after the project completion is comparatively higher than before the project install. After the project install , the firms /industries ,intuitions , medical, shops etc. are install in the village where the many people are directly or indirectly involved in various working activities. It certainly help to raise their income level of the household have increased (to some extent, increase) their income level after the project lunched. The average income from these sources of sample household is shown in the following table and figure below.

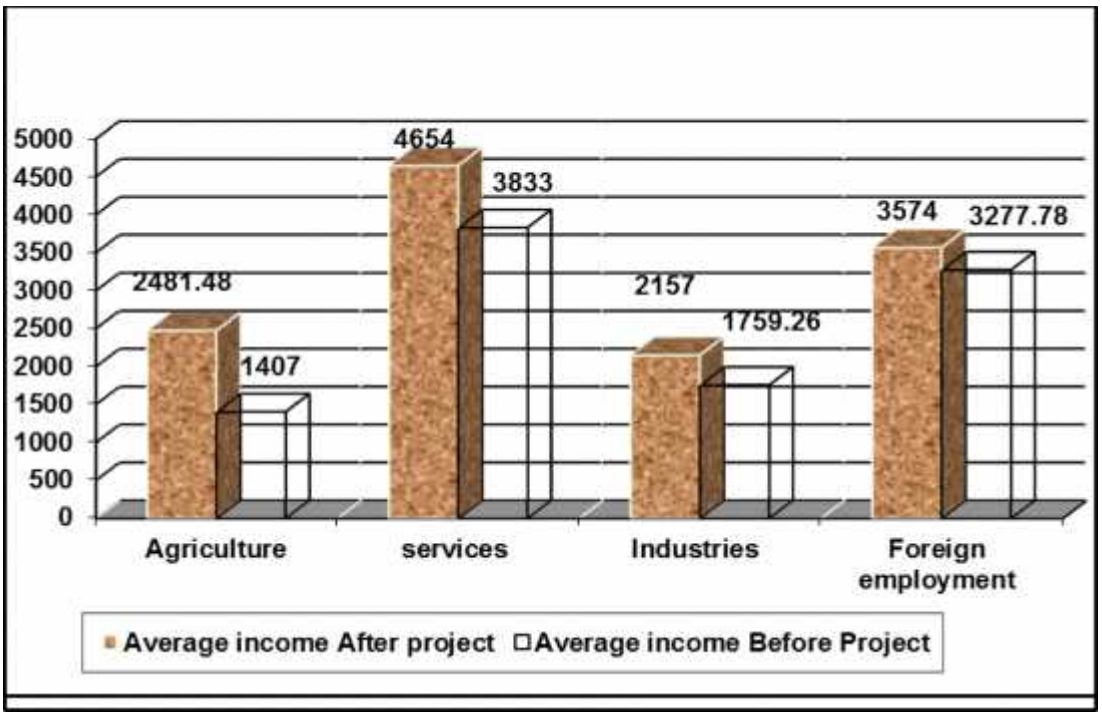
Table No 4.10: Monthly income of the sample household after and before MPH Project

SN	Sources of income from	Average income AP	Average income BP	AP %	BP%
1	Agriculture	2481.48	1407	19.29	13.69
2	Services	4654	3833	36.17	37.30
3	Industries	2157	1759.26	16.76	17.12
4	Foreign employment	3574.074	3277.78	27.78	31.90
Total		12866.55	10277.04	100	100

Source: Field survey, 2019

The above table shows that, the sources of income from different sources after and before the project install. After the project the average income of the sample households from agricultural, services, industries, foreign employments were 2481.48,4654, 2157 and 3574 respectively. However, the income sources of sample households before the project from agricultural, services, industries and foreign employment were 1407, 3833, 1759.26 and 3277.78 respectively. Hence, monthly average income of the sample household from these sources after the project install was higher than before the project install. This implies that, the SHP plays the vital role to increase the income of the sample households.

Figure No 4.14: Monthly income of the sample households after and before MPH



The above table illustrate that the sample households average monthly income from different sources after SHP project install. Figure shows that sample households average monthly income from agriculture, services, industries and foreign employment were 2481.48,4654,2157 and 3574.07 Rs respectively.

4.12 Impact on Expenditure

Project affected families and people of the study area spend their income on food crops, clothing, social activities, festivals, education, and health, miscellaneous. Few households spend for food. Before the project started, project affected families used to spend the lowest amount of on clothing in comprising to after the project. It means there is demonstration effect in clothing by watching TV and using other information technology the sample household's fashion/dress up were changed. Although order of expenditure pattern is changing and amount is increasing over a time due to the increasing of market price and growth of population after the completion of the project. The expenditure on health, education and miscellaneous of the sample households also increasing after the project in comprising to before the project.

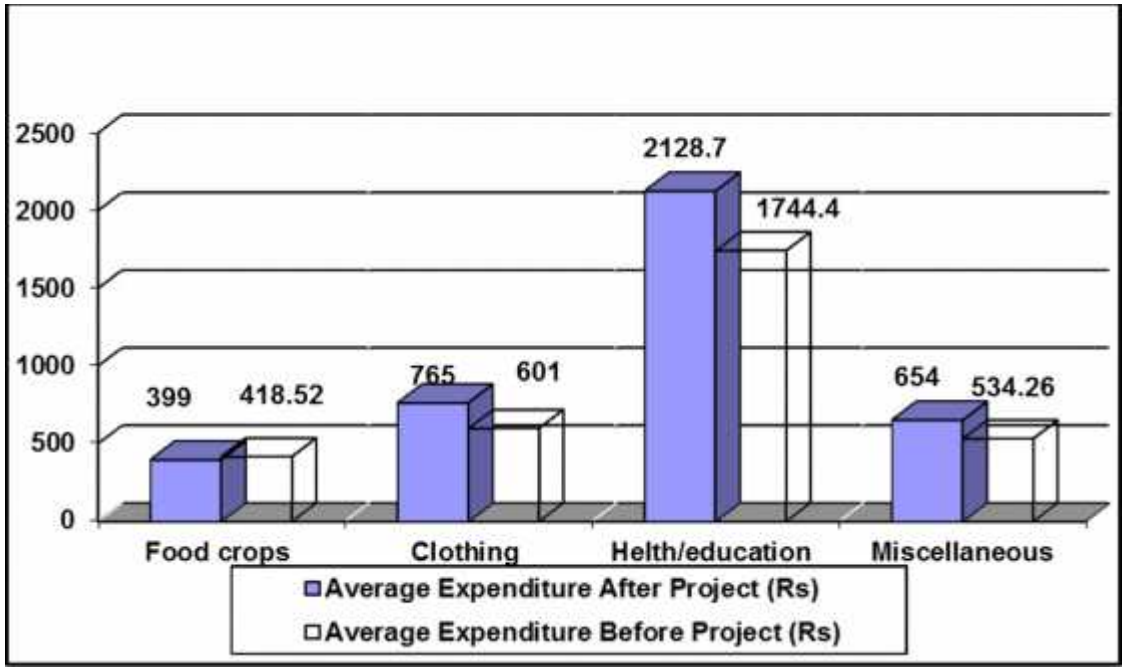
Table No 4.11: Monthly expenditure of Sample households

SN	Monthly Expenditure on	Average Expenditure (AP Rs)	Average Expenditure (BP Rs)	AP %	BP %
1	Food crops	399	418.52	10.11	12.69
2	Clothing	765	601	19.39	18.22
3	Health education	2128.70	1744.40	53.94	52.89
4	Miscellaneous	654	534.26	16.57	16.20
total		3946.70	3298.18	100	100

Source: Field survey, 2019

The table shows that, the expenditure pattern of the sample households after and before the SHP project install. The sample households expenditure after the project on food crops, clothing, health/education and miscellaneous were 399(10.10971%), 765(19.38%), 2128.7(53.9%) and 654(16.57%) respectively. However before the project the expenditure on food crops, clothing, health/education and miscellaneous were 418.52(%), 601(%), 1744.4(%) and 534.26(%). The expenditure after the project on these items increasing in comprising to after the project it implies that value of money, awareness on health /education , demonstration effect lead to increase the expenditure pattern of the sample household after the project , which improve the health, education, technology and other positive impact.

Figure: Monthly expenditure of Sample households



The above figure illustrate that the average monthly expenditure of the sample households on different items or things. The figure shows that sample households average expenditure before the SHP project install from food crops, clothing, health/education and miscellaneous were Rs. 418.52, 601, 1744.4, 534.26 and 3298.18 respectively. However the average monthly expenditure after the SHP project were Rs. 399,765,2128.7,654 and 3946.70 from food crops, clothing, health/education and miscellaneous respectively.

4.13 Impact on Entrepreneurship and Employment

After the construction of micro-hydropower project people involve on different kinds of business. Before the SHP project there are lack of any kinds of electrical and electronic shop and little bit productive work like poultry firm, mills, furniture industries, computer institute, tea shop, cloth shop and electronic shop were there, so, after the construction of small-hydropower project it brings revolution on the entrepreneur behavior of the people. After the installation of the project, the employment opportunities in the village have raised directly and indirectly. Four operator and one electricity consumption change

collector are employed in this project. By installing the industries and running business run in the village where the people are able to create fulltime or partial job.

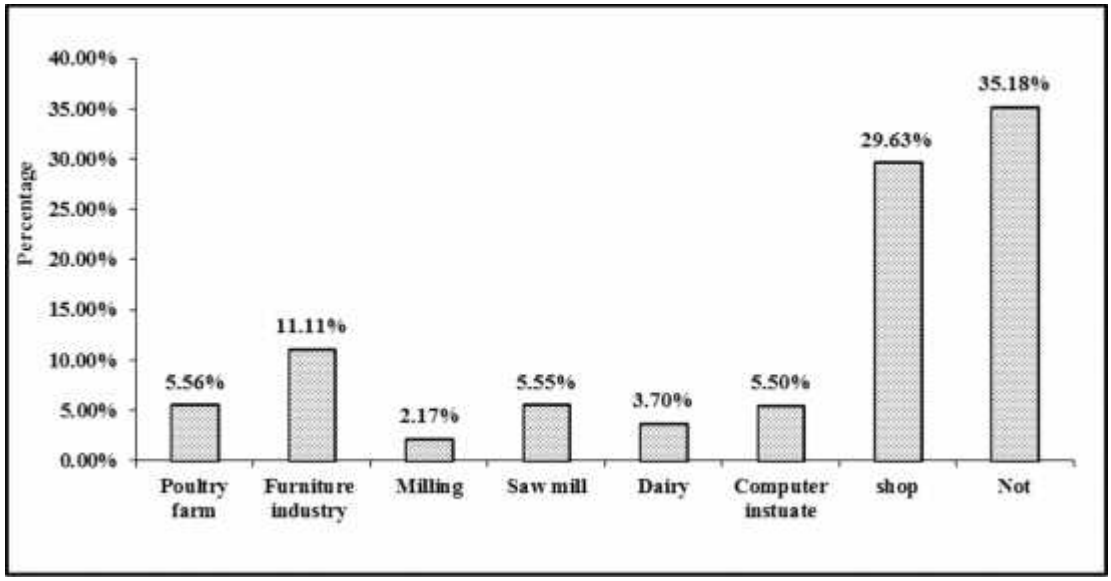
Table No 4 12: Kind of business after SHP

S.N	Kinds of business or firms	Observation Households(HHs)	Percentages	C f%
1	Poultry	3	5.56	5.56
2	Milling	2	3.70	9.26
3	Not	19	35.19	44.44
4	Saw mill	3	5.56	50
5	Furniture	6	11.11	61.11
6	Dairy	2	3.70	64.81
7	Computer instuate	3	5.56	70.37
8	Shop	16	29.63	100
Total		54	100	100

Source: Field survey, 2019

The table illustrates that, the impact of SHP project on entrepreneurship and employment. Out of total sample, 3 (5.56%), 2 (3.70%) and 16 (29.63%) sample household were involved in poultry firms, milling (agro and other), not, saw mill, furniture, dairy, computer institute and shop after SHP project respectively. Finally we can conclude that, after MPH project 65 percent, households were involved in different kinds of business in the project affected area.

Figure: Kind of Business after SHP



The above figure illustrate that the impact of SHP project on entrepreneurship and employment. The figure shows that out of 100% sample households 5.56%,11.11%,2.17%,5.55%,3.70%,5.50%,29.63% and 35.18% sample households were involved poultry farm, furniture , milling , saw mill , dairy, computer training center, shop and involved after SHP project respectively.

4.14 Households Consumption of Electrical Goods before and after SHP

Before electrification, the people in the study area used few electrical instruments like radio, tape recorder using batter in very limited hours TV and computers run by using solar light. After electrification, the possession of the electrical instruments has increased significantly people have now access different information and entertaining facilities. The table below shows that the sample household consumed different electrical goods such as Radio/TV, Computer/Laptop, Iron, Bulb and Other after and before the project.

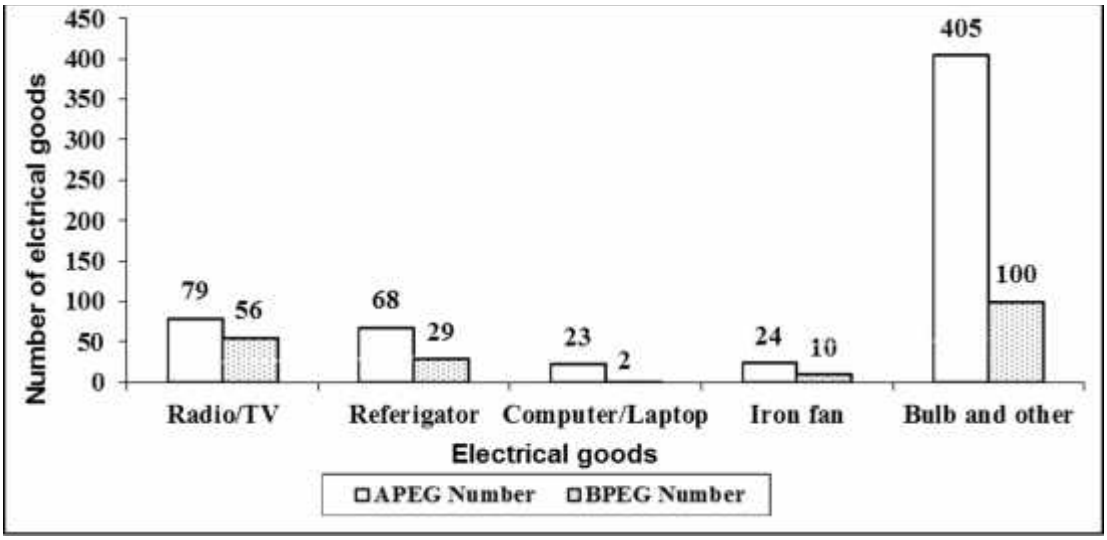
Table No 4.14: Various Electrical goods Consumed by sample households before and After SHP

SN	Electronic goods	Possession AP		possession BP		AP EG %	BP EG %
		No. of EG	HH NO	No. of EG	HH No		
1	Radio/TV	79	54	56	46	13.19	28.43
2	Referigator	68	23	29	2	11.36	14.72
3	Computer/laptop	23	39	2	20	3.84	1.02
4	Iron/Fan	24	22	10	10	4.01	5.08
5	Bulb and other	405	54	100	34	67.61	50.76
Total		599	192	197	112	100	100

Source: Field survey, 2019

The above table and figure illustrate that sample household posed electrical goods after and before the SHP project install. The figure and table shows that, the 54, 23, 39, 22 and 54 sample households have 79, 68, 23, 24 and 405 electrical goods after the SHP project install respectively. Thus we can conclude that after the project number of electrical goods and user households were increased than before due to the SHP project help to provide power or electricity at lowest cost in comprising to other sources of energy. In the study area, people consumed different kinds of electrical goods and it has positive impact on sample households life style, education, health/sanitation, technological improvement, income, employment etc.

Figure No 4.15: Various Electrical goods Consumed by sample household before and After MPH



The above figure illustrate that the number of electrical goods consumed by sample households after and before the project. Figure shows that the sample households consumed number of electrical goods after SHP project (APEG) were 79,68,23,24 and 405 numbers of Radio/TV, Referigator, Computer/laptop, iron/fan, bulb and other electrical instruments respectively. However before the SHP project sample households consumed Radio/TV, Referigator, Computer/Laptop, Iron/fan and bulb and other electrical goods were 56,29,2,10 and 100 respectively. Finally, we can conclude that after SHP Project sample households consumed electrical goods were greater than before the SHP project. It means SHP project plays vital role to increase the consumption of electrical goods.

4.15 Benefits of SHP Project

Micro-hydro is boon to people because it provides electricity to run electrical and electric equipment's such as TV, radio, mobile phone, refrigerator, washing machine, computer/laptop, heater and other. Impact of SHP project on access to information has been assessed through the ownership of a number of communication devise, radio listening, T.V. watching habits, using trend of internet services. General awareness of

various aspects of life is sky up, even in rural lives by information; information technology jumps large steps in the present decade.

4.16 Advantages of SHP

Survey found that all the sample households i.e., 100 percent fell relaxed or enjoy using SHP system for lighting all of them agree that it is completely smokeless, many of the sample households are influenced from its various advantages like improvement health, time saving, easy to work at night, increased reading habits and so on which is shown in table and figure below.

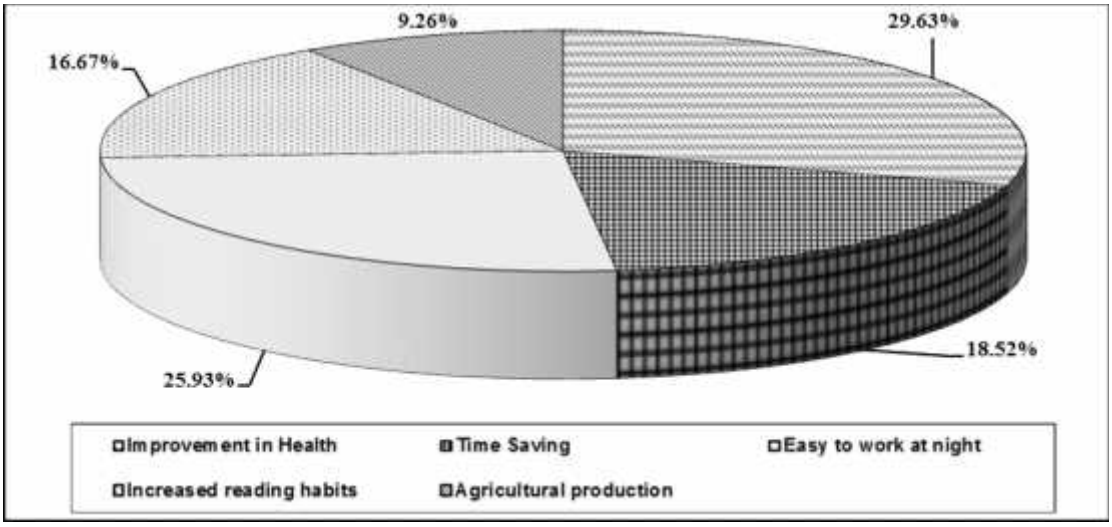
Table No 4.16: Advantages of SHP

SN	Advantages of SHP	Sample Household	%	C f %
1	Improvement health	16	29.63	29.63
2	Time Saving	10	18.52	48.15
3	Easy to Work at Night	14	25.93	74.07
4	Increased reading Habits	9	16.67	90.74
5	Agricultural production	5	9.26	100
Total		54	100	100

Source: Field survey, 2019

The above table depicts that the advantage of SHP project in the sample Households (HHs). Out of total samples, 16 (29.63%) respondent health condition were improved after the project install. Similarly, 10 (18.52%), 14 (25.93%), 9 (16.67%), 5 (9.26%) and 5 (9.26%) sample households were saving time, easy to work at night, improved reading habits and promoted agricultural production after the SHP project install.

Figure: Advantages of SHP



The above figure illustrate that the sample households reported the advantages of SHP project. The figure shows that the 29.63%, 18.52%, 25.93%, 16.67% and 9.25% households reported that they improve their health, time saving, easy to work at night, increased reading habits, agricultural production after SHP project respectively.

To sum up, when electricity facility is available there is increases the use of audio and visual media. By using these types of media new generation can imitate or copy of every things that they have heard or saw, so it is proved that project has affected in social and cultural properties education is the key indicator of the human development, it plays a vital role in the efforts of any endeavor to uplift a society fresh representation an scarcity, needless to say it has a society from repression and scarcity and needless to say it has positive role in the success of life. Agriculture sector is the main source of the national income. Agriculture has been the main sector of employment and for income generating activity in this area as well like in most in our country. Thus it can be regarded that agriculture is the main source of livelihood for this area. But this sector is very backward before the project installed due to the lack of irrigation, agricultural inputs, training and skill development program. However, effect the project there were improvement on agriculture production to some extent. Thus we can conclude that, SHP played the vital role to uplift the human drudgery in the village after this project, people are able to live in light at night, which made the night life easier. Before SHP, people compiled for use to

grain, this consumed more time of villagers as well as make villagers' life complicate. Now by lunching the agro-mill villagers life become easy and it help to reduce the drudgery of women. By lunching the poultry firms, knitting, dairy computer institutes, medical and other business help to generate economic activity and improve the economic condition of the villager. SHP help to raise the social condition, improvement in the health, increased in reading habits of the sample households.

4.17 Benefits from installation of SHP on sources of information

Micro-hydroelectricity is boon to people because it provides electricity to run electrical and electronic instrument such as, T.V., mobile phone, computer/laptop etc. Impact of the SHP on access information has been assessed through the ownership of a number of communication devices, radio listening and T.V. watching habit. General awareness of various aspects of life is sky up; even in rural lives by information technology information technology jumps large steps in the present decade. Rural people also up dated them by revolution of sources of information we asked to the respondents in a different ways to know about the trend of receiving main program or information from various sources of media or information technology after SHP.

Table No 4.17: Benefits from installation of SHP on sources of information

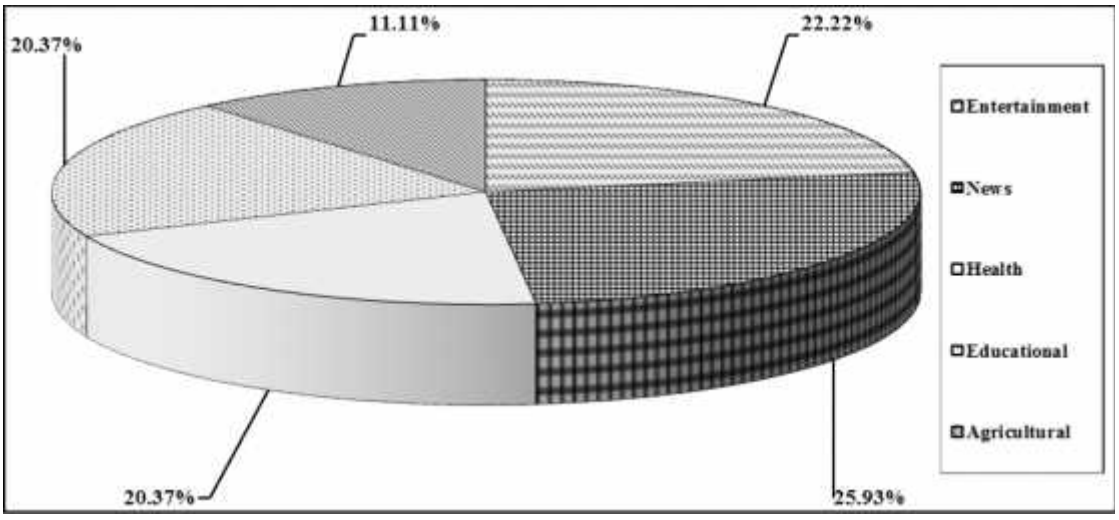
SN	Type of Program	Observation	Percentage	C f %
1	Entertainment	12	22.22	22.22
2	News	14	25.93	48.15
3	Health	11	20.37	68.52
4	Educational	11	20.37	88.89
5	Agricultural	6	11.11	100
6	Other	0	0	100
Total		54	100	100

Source: Field survey, 2019

The above table and figure shows that the receiving main program on TV/Radio and other various sources of media/information technology. Out of the total, 12 (22.22%)

sample household receive the entertainment program as a major program on sources of media after MPH. Similarly, 14 (25.93%), 11 (20.37%), 11 (20.37%), 6 (11.11%) and 0 (0%) sample households receive the news, health, education, agricultural and other program after SHP respectively.

Figure No: Benefits from installation of SHP on sources of information



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4.18 Benefits after installation of SHP on Communication

This is the era of science and technology so the internet, communication are the basic need of the people. Most the people of this study area introduced with mobile phone and youths are familiar with internet in mobile. The communication of this area is significantly improved than before the SHP. Ncell built, network communication tower in the top of the village which makes the entire villages communication better if there was no SHP, Ncell tower would not built then communication has still in poor conditions because 10kw electricity power is need to run this tower, now this insufficiency was

fulfilled by the installation of this SHP we asked to the respondents in a different ways to know about what is condition of communication after SHP.

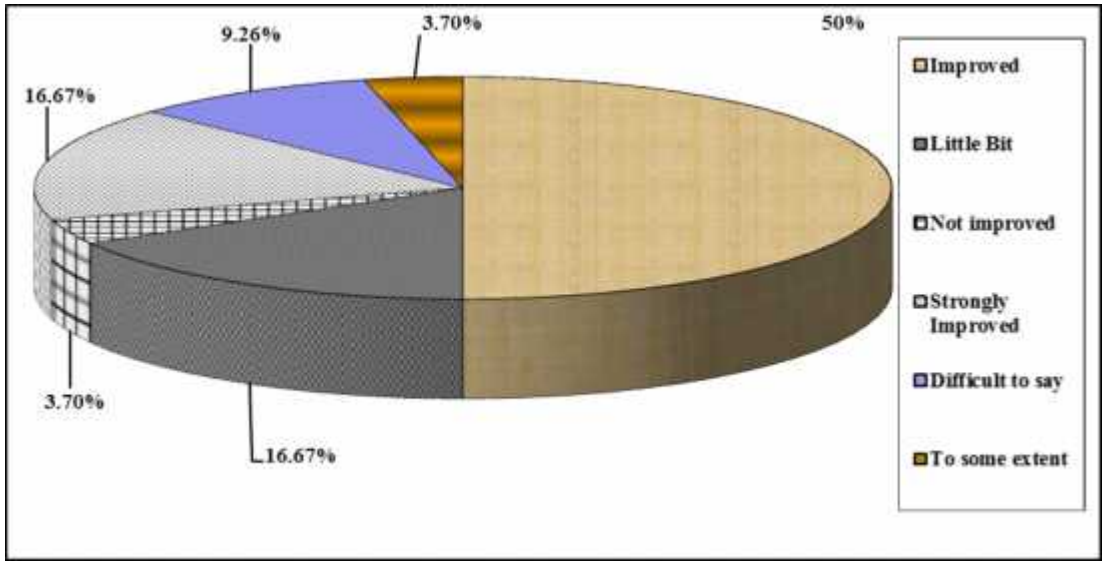
Table No 4.18: Benefits on Communication after SHP

SN	Status	Sample Household	%	C f %
1	Improved	27	50	50
2	Little Bit	9	16.67	66.67
3	Not improved	2	3.70	70.37
4	Strongly Improved	9	16.67	87.03
5	Difficult to say	5	9.26	96.30
6	To some extent	2	3.70	100
Total		54	100	100

Source: Field survey, 2019

The table depicts that the condition of communication after SHP installation. Out of total sample households, 27 (50%), 9 (16.67%), 2 (3.70%), 9 (16.67%), 5 (9.26%) an 2 (3.70%) households report that, the condition of communication after SHP project were improved, little bit, not improved strongly improved, difficult to say and to some extent respectively.

Figure No: Benefits on Communication after SHP



4.19 Impact on Skill Development

People of the local area involved and same the project construction method during the construction period. It helps them to develop technical skill of construction methods. Some youth had explored their skill such as civil works. Welding metal works electronic wiring etc. developed during the construction period in other places in the study area SHP help to develop the technical and mechanical skills by providing electricity, which leads to improve infrastructural development of the study area and nation.

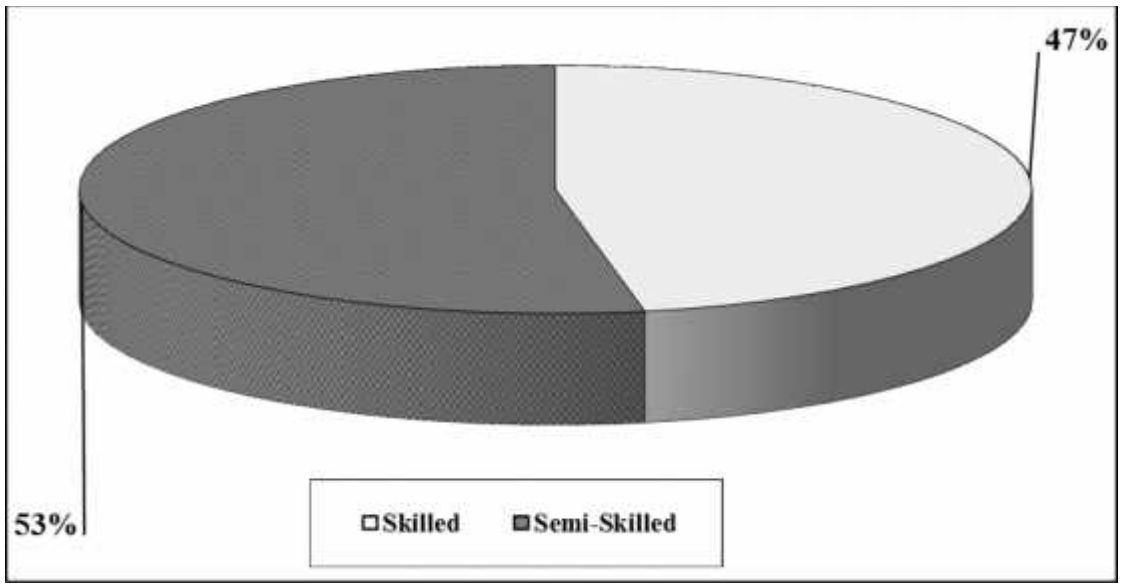
Table No 4.19: Skill developments of Sample household after install SHP

SN	Skill of HHs	Observation	%	C f %
1	Skilled	47	47	47
2	Semi-Skilled	53	53	100
Total		100	100	100

Source: Field survey, 2019

The table depicts that the skill development of the sample households. Out of total skilled manpower in the sample household 47 (47%) and 53 (53%) people are skilled and semi-skilled respectively. The total population of the sample households is 305, out of total population 15.41 percent population was skilled after SHP project and out of total population of sample household's 17.38 percent population was semiskilled after SHP project install. Finally we can conclude that SHP project help to develop the skill of the study area gradually.

Figure No: Skill development of Sample household after installs SHP



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CHAPTER - V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Among the alternative energy (bio-gas, solar power wind power, Improved Cooking Stove (ICS) and SHP) more popular and available in Nepal is SHP, which is technically and environmentally feasible and most appropriate technology for Nepal. SHP has considered up to capacity of 100 KW and less than 5 KW as Pico-hydro SHP provides access to electricity and other mechanical forms of energy for agro-processing such as rice hulling, shelling, grinding and oil expelling. Various kinds of SHP devices e.g. propeller turbines, cross flow turbines, pelton wheels MPPU, Peltric sets, improved Ghatta have been developed in the past two decades.

Small hydropower has been able to bring about profound socio-economic and technological changes. The implication of SHP for rural development is an introduction of a modern technology in rural context. There prepare rural community for undertaking rural industrial activities, nurturing of entrepreneurship in a rural areas and pretention of entrepreneurs in rural areas. This study reflects the overview of Nepalese rural energies sources status and discusses various energy issues through a case study of Bhirgu Khola small hydropower project Sanfebazar-11. The study has discussed various merits of SHP system, it not only provides energy for lighting but also helps in improving health condition, saves time, makes easy to work at night, technological improvement, standard of living, income, employment, infrastructural development as well as productive work.

This study has been conduct from the direct interview method with 54 respondents. There respondents were selected by simple random sampling. The major findings of the study are pointed as follows:

i) The main sources of energy of the sample household before SHP were firewood, biogas for cooking and for lighting kerosene and solar. New SHP, firewood, solar and biogas is the main sources of energy. In which, SHP is used all the sample households for lighting purpose and most of the households used

SHP for cooking. It reduces the over expenditure on traditional energy sources. 57 percent respondents are agreed that SHP help to improve the health condition of the people and it minimizes the different kinds of diseases.

ii) After SHP project people installed industries such as furniture, agro-milling, saw mill computer institute, poultry firms etc. and create the employment opportunities whereas 35 (64.81%) sample households has raided their income.

iii) Agro-mill make the especially women life easy and the living standard of the respondent has changed after electricity.

iv) Agricultural production has increased than before by getting irrigation and other facilities. Other business such as grocery, small medical center and photo studio, rice mill shop and furniture also raise the villager's income level.

v) Possession of various electric instruments has increased after SHP, which make the villagers life easy and help to change the life of the people.

vi) The study habits of the children have been increased. 87.03 percent (447) households Said their children's performance in the school has improved in holistic ways.

vii) The entire households (100%) is ready to pay more amount than prevailing rate to maintain the project and make it sustainable.

5.2 Conclusion

i) SHP (1-100 k w) is considered as the best options for providing electricity to hilly and mountain rural villages. The rural villages can enhance their livelihood and style of living while pressuring environment. Sites suitable for such SHP installations are abundant for e.g. traditional water mills, called Ghatta are very common in hilly areas with streams and used for grinding grain, hulling rice and expelling oil. SHP has fulfilled community's requirements, such as running agro-processing mills, bakery, mechanical workshop, rural enterprises (saw mills, poultry farming, computer training, photo studio etc.) and so on in locations of the hills and mountains with low population density and scattered settlement. Hence, there is a high prospect of SHP development for all round and sustained development in rural Nepal, particularly in rural areas wind and solar energy have not been fully utilized because wind energy is still research stage and biogas is suitable only warmer climate. In this sense, SHP has great potential contributor towards a reduction in demand of traditional fuels for meeting rural energy in isolated rural areas of the country. But the development of SHP has not been equal among sixty-one districts, five development regions and three ecological regions in terms of installed capacity (mw) and number because of power generated could concentrate in a few places among them. So, that in average, the development of SHP (micro hydro) schemes with installed capacity (k w) and is overall in terms of numbed households in the country.

ii) The topographical feature provides huge potentialities for SHP development; however SHP development faces wide range of challenges towards efficiency enhancement, management system development, institutionalization and arranging sustainable financial support. The world has commitment against global warming and deteriorating ozone layer and deforestation. About 136 countries have ratify the "Kyoto protocol" on reducing the carbon emission to the 1990 level by 2002 to 2012 a new concept on pollution prevention has emerged as the

tradition of carbon. In this regard, SHP has a plays inevitable role to reduce carbon for improve health and environment management.

iii) SHP has positive impacts on income and employment. It helps to rise in income and employment by helping to establishment of new businesses.

iv) It reduces the expenditure on different energy sources like firewood, kerosene, biogas etc. So, it can be less expensive source of energy in the rural area. Due to the installation of SHP, the health condition also gets improved.

v) The expenditure on health education increasing due to the awareness about health and education after SHP project. Therefore, there is positive impact as health education.

vi) Before electricity, people have been using maximum firewood as light or cooking and lamp have been using as light but when SHP established the need of firewood has reduced which has helped to converse forest. Electricity is closely related with human life therefore all respondent's living standard has been changed after SHP.

vii) Electricity supply has extended the social and recreation activities i.e., purchase and use of tape recorders, radio, TV, refrigerator, iron, computer, rice cooker etc. The status of health and sanitation how improved after electricity facility. After electricity facility, studying hours of students have been increased.

viii) It has been found that education status of student has improved. To build the SHP sustainable, repair, maintenance and operation schedule should be necessary therefore there is operation schedule in powerhouse for their purpose users and management committee is fully responsible. The result of the analysis is positive so, the project is economically feasible.

ix) Over all there is positive impact on health, education, communication, skill development, income, employment, expenditure infrastructural development, technological improvement as well as productive work.

5.3 Recommendations

Rural energy development program (establishment of SHP project) will help for rural electrification, environment management and poverty alleviation to some extent in the rural part of the country, with unprecedented success on economic development through the rural energy development program. The development efforts needs to be the use of alternative energy should be improvement. Appropriate policy on pricing, market arrangement and energy quality regulation needs to be developed for sustainable growth of rural energy. The SHP deserves the high priority in view of its role in the socio-economic development of Nepal. It is filet that on less the micro-hydropower sector is provided with adequate technical, and management support, it will not able to contribute to national development to the extent one can expect from it. Hence, the specific recommendations are as follows.

i) The participation of women in planning and implementation of Micro-hydropower plant needs to be ensured.
ii) The HMG/N emphasize on subsidy policy with equity for the development of SHP in rural areas all over of the country.
iii) Preliminary studies and detailed feasibility studies (data base information) of all possible sites of different streams of the country should be done and kept in record for ready to use when required.
iv) The people should be made aware of people participation, good governance, and responsibility for the sustainable development of SHP.
v) The government should invest much of fiancé in building SHPs in remote areas of the country.
vi) There exists a wide gap between policy makers and implementation. So much of the funds should be set out side for the task leaks out which in the channel between policy formulation and project implementation.
vii) SHP project should be developed timely to meet the present growing needs in remote rural areas of the country.
viii) Information technology particularly GIS should be taken for adequate identification to the development of SHP.

ix) Mutual bilateral relationship should be developed to attract the foreign aid and investment on SHP sector.

x) Lack of timely maintenance is another problem technically. So, the technicians should be provided by government to maintenance SHPs.

xi) The sustainability of SHP is another issue. The dam constructed is located at the week area as well as 'Pipe Line' is built on supply areas so there is fear of landslide. So the dam and 'Pipe Line' should be required for more securely.

xii) House should use electricity for more productive activities.

xiii) Small industries need to be established in the village. So that the SHPs revenue can be increased and further investment can be made. A manual in Nepali is to be prepared and on the basis of it the operation of the plant is to be carried.

xiv) The gap between demand and supply of electricity is increasing adversely day by day. So the government should play vital role to solve this complex problem.

REFERENCE

AEPC (2013), A Year in Review, His Ministry of Government of Nepal, Ministry of Science and Technology, Dhobighat, Lalitpur, Nepal.

Cambridge: Cambridge University Press.

Chambers, R. (1993), Rural *Development: Putting the First Last*. London: Longman.

CRWRC (2004), Defining Community Development Core Learning Modules: Community Development and Transformation, Module 1: Basic Principles and Practices, Lesson 1

Dahal, S. *and* Shrestha, R. (2014) Sustainability of Micro-hydropower in Nepal: A case study of Rukum District *Department of Mechanical Engineering, Central Campus, Pulchowk, Institute of Engineering, Tribhuvan University, Nepal*

Dams & Development (*2000)* A new framework for decision-making – overview World Commission on Dams *November 16 2000* 1

Ferguson J. *(1990),* the anti politics machine "Development De-politicization and Bureaucratic Power in lesotho, University of Minnesota press Mimmeaplis London.

Portes, A. (1997), Neoliberalism and the sociology of development: Emerging treads and unanticipated facts, 'population and Development Review

Rostow, W.W. (1960).The Stages of Economic Growth: A Comparative Manifesto.

Tiwari, D. P. (2010), *Micro-Hydro Power in Nepal: A Case Study of Bhorletar MHP Plan,* An Unpublished Dissertation Submitted to the Central Department of Rural Development, T.U.

QUESTIONNAIRE

1. General information of respondents

SN	Question	Code	Answer
1	Name of the village:		…….
2	Ward no:		……
3	Name of the house hold head:		.....
4	Name of the respondents:		……
5	Gender:	01-Male	…….
		02-Female	
6	Age:		……
7	Cast:	01-Brahmin	
		02-Chetteri	
		03-Jajati	
		04-Dalit	……
		05-Other	
8	Religion:	1-Hindu	
		2-Buddhist	
		3-Cheristian	
		4-Kirat	
		5-Other	……

2. Small-hydropower and rural electrification

SN	Question	Code	Answer	Skip
9	When was Small-hydropower installed?		……	
10	Do you agree Small -hydropower help in rural electrification?	1-Agree 2-Strongly agree 3-Neutral 4-Disagree 5-Difficult to say	……	If 4 go to QN 2.5
11	How much units of electricity do you consume per- Month?		…….....	
12	How many hours per-day you Access to Electricity for the following purpose?			
	1. ighting		.....	
	2. Cooking		.....	
	2. V/Radio		……	
	4. For Business Purpose		……	
	5. Personal use		……	
	6. Other (specify		…….	
13	What is the condition of the forest after this project?	1-Improved 2-Not improved 3-Little bit		

		4-Difficult to say		
14	How much money do you pay for electricity per- month? (in RS)		Max. RS……	
			Min. RS……..	
15	What was the installed cost of the project?(IN RS)		RS.....	
16	how much did you self-fund to install Micro-hydropower ?(in RS)		RS.....	
17	Such Small-hydropower project is sustainable or not?	1-Sustainable	…….	
		2-Not sustainable	…….	
		3-To some extent	…….	
		4-Difficult to say	…….	
18	Where you maintain the maintained cost of the project?	1-User 2-User committee 3-The place owner 4-Intuitions		
19	For the sustainability of the Small-hydropower project what should you done personally?		.....	
20	What should be doing for the			

	sustainability of the project?			
	1. From Government Side		……	
	3. rom Users Side		……	
	4. rom Management Side		……	

3. Socio-economic Impact of Micro-Hydropower

A. Education

SN	Questions	Code	Answer	Skip
21	After electrification, do your children study hours have been increased?	1-Increased		If 3 go to QN 3.3
		2-Decreased		
		3-Same as before		
		4-Difficult to say	.....	
22	How much time has been increase after Small-hydropower install?	01-Less than 1 hour		
		02-1 to 2 hour		
		03-2 to 3 hour		
		04-More than 3 hours		
		05-Un known	…….	
23	Has their children's preference at school improved?	1-Strongly improved		
		2-Improved		
		3-To some extent		
		4-Not improved	…….	

24	Do you conduct or participates any literacy class after install Small-hydropower?	1-Yes 2-No	…….	If 2 go to QN 3.6
25	What type of literacy class do you conducted or participated?	1-Adult 2-Pre-primary 3-Other (Specify)	…….	
26	What is the number of family member literate in your family?		AP BP M.... F..... F..... M....	
27	Have your family member dropout from school or not?	1-Yes 2-No	……	If 2 go to QN 3.9
28	What is the cause of dropout?	1-Unwillingness to study 2-Due to their job 3-Other (specify)	.....	
29	What is the educational status of your family after install plant?	01-improved 02-strongly improved 03-same as before 04-difficult to say 05-not improved	.....	

B. Health

SN	Questions	Code	Answer	Skip
30	Did Any of family members suffer From illness after Small-hydropower?	1-Yes 2-No	.....	If 2go to QN 3.12
31	If yes, what type of diseases?	1-Asthma 2-Bronchitis 3-ENT irritations 4-Eye inflection 5-Other(specify)	.....	
32	Sources of drinking water and distance?(in meter)	Well Spring water tapes Stream	…… …… ……	
33	Did any of your family suffer from Water borne disease past one year?	1-Yes 2-No	.....	
34	Does your family have a toilet?	1-yes 2-No	.....	If 2 go to QN 3.16
35	When it is build?	1-After Electricity 2-Before Electricity	.....	
34	What type of it is?	1-Kachhi 2-Pakki	.....	
36	Does any family member	1-Yes		

	suffer from Any kinds of disease before Small-hydropower?	2-No	.....	
37	If yes what kinds?		.....	
38	Any of family member dead after install Small - hydropower or not?	1-Yes 2-No	.....	If 2go to QN 3.20
39	What is the main cause of death?		.....	
40	How often your family member listen / watching Health programs on Radio and TV?	1-Every day 2-Few times in a weak 3-Once in a week 4-Never 5-Some times in a month	.....	
41	What is the status of health and sanitation after install Small -hydropower?	1-Improved 2-Worse 3-Same as before 4-Difficult to say	.....	

C. Income, employment and entrepreneurship

SN	Question
42	Have you done the productive work by Using Small -hydropower system?
43	Does the project help to promote the Agricultural product?
44	Is your opinion how it is help?

45	Do you find that after involving on Productive work it is help to increase Your income level?
46	How much income increases monthly? (in RS)
47	No of people employed in your family At the project affected areas?
48	What is the average monthly income of the family? (In RS)
	1.Agricult
	2.Business
	3.Services
	4. industries
	5.Other (specify)
49	What is average monthly expenditure of your Family? (in RS)
	1.Food Crops

	2.Clothing	
	3.Health /education	
	4.Festival	
	5. s	M

4. Households Consumption of Electrical Goods and Benefits of MHP

A. Electric Goods Consumed by Households

SN	Question	Answer	
50	How many electrical goods or instrument Does your family possess before and after Small -hydropower ?(write in number)	BP	AP
	1.Radio/TV	.....	.....
	2.Referigator	.....	.....
	3.Computer /Laptop	.....	.....
	4.Iron/Fan	.....	.....
	5.Other (specify)	.....	.....

B. Benefits of MHP

SN	Question	Code	Answer	Skip

451	What was the main source of energy In your family after Small -Hydropower installed?	1-Fire wood 2-Bio-gas 3-Solar 4-Kerosene 5-Electricity	.....		
52	After install Small-hydropower, it helped to save time or not?	1-Saved 2-Consumed 3-To some extent 4-Difficult to say	.....		If 2 go to QN 4.5
53	How much time it saved? (in hour)		.....		
54	Small-hydropower can be helpful to develop the skill of your family or not?	1-helped 2-to some extent 3-difficult to say 4-not helped	.....		
55	How many family members are following type?		AP	BP	
	1.Skilled				
	2.Semi-Skilled				
56	What type of program does your family member listen on radio, watching TV and uses other various sources of information?(number family		AP	BP	

	of members)				
	1.Entertrainmet				
	2.News				
	3.health				
	4.educationa				
	5.agricultural related				
	6.other (specify)				

57	Have you seen the following changes in the Activities of your children due to Watching TV, Using Internet and using other sources of information?	01-Talking style			
		02-Dress up			
		03-Sports			
		04-Dance			
		05-Other(specify)	.....		
58	Has Small-Hydropower improved the communication and information in Efficient way?	1-Improved			
		2-little bit			
		3-Difficult to say			
		4-Not improved	.....		
59	If your family have not access the following technology then what time it take to get such		AP	BP	

	sources of information? (in hours)				
	1.Phone				
	2.Internet				
	3.Other (specify)				
60	What advantage of Small - Hydropower attracted you must?	1-Improvement in health	.....		
		2-Time saving			
		3-Easy to work at night			
		4 Increased reading habits			
		5-Agricultural production			
		6-Other (specify)			

Please comment on this questionnaire…… Thank you.