

CHAPTER I

INTRODUCTION

1.1 Background

Nepal is a small state situated in the lap of the great Himalayans. It occupies area of 0.3% of the Asia and 0.03% of the world. Geographically, it lies between the latitudes $26^{\circ} 22'$ N to $30^{\circ} 27'$ N longitudes $80^{\circ} 4'$ E to $88^{\circ} 12'$ E. Its elevation ranges form 60m to 8848 m. The average East to West length is 885 km and the average South to North breadth is about 193 km. It has been bordered by the two most populous countries of the world; India in the East, West and South, and China, in the North.

Despite Nepal's small size, because of its evolution from such a low land to the highest peak, is very rich in all sorts of diversities like flora, fauna, landscape, weather, geography, lifestyles and so on. Due to diversified topography, Nepal has a lot of resources which is still not been used, so it is a land full of possibilities.

The land locked position, rugged topography with limited arable land (17%, of total land), poor resource base, and high incidence of poverty are major causes of economic vulnerabilities. Nepal's economy is facing down falls these days. This makes it susceptible to increasing imports and foreign dependence. Nepal has immense stock of endowed natural resources. Unfortunately, we are still poor and the least developed because of underutilization of the available resources. In one hand, Nepal's economic growth rate is low. On the other hand, the economic development is at infant stage. However, more or less, all sectors such

as agriculture, industry, trade and commerce, transportation and communication, social services and tourism are developing smoothly.

Energy is the basic need for all these sectors. Moreover, energy is necessary in every step and movement of human life. The world has been modernized through energy. So, energy is the yardstick for the economic development of a country in modern age. The degree of economic development is largely determined by per capita energy consumption. Energy, as an indicator, shows the living standard of people. Demand for energy has been gradually increasing along with growing population and economic activities. Adequate and affordable supply of energy is basic prerequisite for socio-economic development of a nation.

The trend of energy consumption is predominated by traditional sources particularly, the fuel wood. Over utilization of forest creates serious environment problems. Fossil fuels (petroleum and coal) are imported. It demands a large amount of foreign currency. Nepalese economy, however, is facing the problems like trade deficit, debt trap, and unfavorable balance of payment in one hand, people's per capita income (US \$ 320) and Purchasing Power Parity (US 1550) are very low, on the other hand. The use of solar energy is negligible and wind energy is still at survey stage. But the water resource is immensely available in Nepal.

Hydropower is nature's gift to Nepal. It is abundant, it is clean and it is renewable. It can be cheap, and it can lift Nepal out of poverty. Nepal's water is its white gold. It is a perennial resource, and unlike petroleum it will never run out and, it won't contribute to global warming. Nepal's steep rivers make it ideal for hydropower generation, and the potential is tremendous.

Nepal is the richest country in water resources in Asia and the second richest in the world. Nepal has about 6000 large and small rivers hurling from the Himalayas and high mountains towards the plain of Terai. The total length of these large and small rivers is about 45,000 km. The perennial nature of Nepalese rivers and steep gradient of the country's topography provide ideal conditions for the development of some of the world's largest hydropower projects in Nepal. The total hydropower potential of these rivers is estimated to be about 83,290 MW, of which 45,520 MW (54.65%) is technically feasible and 42,133 MW (50.59%) is economically viable. The country's critical potentiality occupies 2.27 percent of world's potentiality of hydropower. However, Nepal has generated 563.870 MW hydroelectricity up to the end of FY 2007\08. It is 0.67 % of theoretical potentiality and 1.34 % of economic potentiality. Out of the total installed power, 407.53 MW and 156.34 MW power have been installed from public and private sectors respectively.

The demand of electric power has increased by more than 11.31% in FY 2007/2008 where as the production has been increased by 4.22% only.

It is suppressed due to the limited supply. Industries, trade and commerce, services, transportation, communication and other infrastructures are expanding rapidly. Electric power is required for those sectors. In this way, there is a large gap between demand and supply of electric power because its demand exceeds supply. So, there is high and counterproductive requirement of installation of hydroelectricity project.

There are four scales of hydropower projects in Nepal. They are mega, large, medium and small. The aim of installation of mega and large

hydropower projects is to fulfill long term national demand and export to India and other SAARC countries.

The target of installation of medium scale hydropower projects is to meet national demand for energy by connecting in national grid system. These projects play important role for tourism development, agro-based industries, irrigation and other industries. The installation of small hydropower projects is required for rural electrification. The installment of this type of projects is emphasized in those areas where electric power cannot be supplied through the national grid and where infrastructures haven't been developed adequately. Likewise, such projects are technically as well as economically feasible at rural areas. It is also preferred in those areas where the small and cottage industries can not run due to the lack of sufficient energy. Similarly micro hydropower projects are installed in the isolated and backward areas as the alternative of other energy sources.

Hydroelectricity was first originated from water resources at Rothberg of Northumberland in 1879. Lord Armstrong lit his house with electric lamp by using current from a dynamo driven by a water turbine. The first hydropower station in Europe for supplying electricity to the public was built at Zurich, Switzerland in 1882. It was based on the principle of kinetic energy.

In the context of Nepal, Pharping Hydel Plant (500KW) installed in 1991 A.D. at Pharping, is the first hydropower project. It has put of supplying electricity in Katmandu. Then 24 years later second hydropower project, Sundarijal (900KW), was installed in 1935 A.D. Now its capacity is 640 KW. The development of hydropower went ahead in progressive path smoothly. Only 2077KW power was installed

from hydropower at the starting date of economic plan in 1956 A.D. Every economic plan has been making plans and programs for the development of hydropower in Nepal.

Government of Nepal brought out new liberal policy about the development of hydropower to encourage private sector (foreign as well as local investors) by issuing ***Water Resources Act – 1992, Hydropower Development Policy-1992*** and ***Electricity Act- 1992***. Especially, government of Nepal has adopted this liberal policy to attract private investment for the development of small hydropower projects. Nepal Electricity Authority (NEA) has announced its policy to purchase the power generated by the private developers/ investors of small hydropower projects up to 5 MW capacity. Even the present government has brought forth the slogan of Public-Private Partnership (PPP) to make the environment conducive for the private investors. In order to support the investment required for the installation of hydropower projects, the government has established a power development fund (PDF). Similarly, domestic commercial banks have been autonomously investing on hydropower projects as priority sector investment. This policy has encouraged the private investors to install small hydropower projects to meet the growing national demand for energy in the country.

At present, the role /effort of the government and NEA is not adequate to harness the vast power generation potentiality of the country and meet the growing demand in the short-run. ***Electricity Act- 1992*** has facilitated wide business opportunities for local and foreign investors to develop hydropower projects. In this regard, the government has already granted permission to Independent Power Producers (IPPs) to develop hydropower projects.

Himal power limited, a Norway-Nepal joint venture company built the Khimti I Hydropower Plant which is a run- of- river type hydropower plant. This is the first large scale hydropower project launched by private investment in Nepal's energy sector. Today, Khimti I project is not just an electricity supplier to the urban centers, but also a project which works for the holistic development of the local communities.

In 1992, Kirne (place where the project is situated) was barren and desolate alluvial plain. Today it is a vibrant town with telephones, television, internet access, good school, good water supply, irrigation and electricity. HPL the owner of Khimti I Hydropower Plant) has contributed to the electrification of 4600 households, built a 635 KW Mini Hydropower Plant, supported several schools and irrigation system, drinking water and awfully equipped clinic in the area. All sectors of the surrounding area such as agriculture, industry, transportation, trade and commerce, communication and social services have been benefited by this project.

1.2 Statement of the Problem

Energy plays a key role in sustainable economic growth. The role of energy in our economy is important both from the stand point of domestic use and export. The pace of industrialization was sluggish in the past due to the shortage of energy. The pace of industrial development can't be accelerated until the obstacle of the availability of energy is removed. The case is same in agricultural sector for food processing, cottage industries, water-mill, lift water for irrigation and drinking, and so on.

The demand of energy is increasing even though per-capita energy consumption is very low in the country. Many least developed countries are facing energy problem due to rising price of fossil fuels and high rate of depletions of the forest resources. Nepal is not the exception of this issue.

Consumption pattern of Nepalese energy source is predominated by traditional sources particularly fuel wood. The over exploitation of forests resources is resulting the serious environmental problems. Large percentages of people are still depending on firewood for primary purpose. The pressure on forest resource has been increasing along with population growth day by day. In the contrary, the commercial energy sources like coal and petroleum products are expensive. There is no domestic supply of the petroleum products. So, large amount of foreign currency is needed for this purpose, which may cause deficit balance of payments of the country. The entire petroleum products have to be imported from abroad. The cost is very high for Nepal's fragile economy.

High potentiality of wind and solar energy have not been significantly utilized and exploited. These resources are technically complicated and costly. Wind energy is still at the research stage whereas biogas technology is suitable only in warmer climatic areas like Terai and not much suitable in hilly and mountainous regions.

In this background, hydropower is only appropriate technology to fulfill the energy demand of the rural, hill, Terai and urban areas. It is one of the well-known energy sources. The energy source is continuously renewable, non-polluting and efficient. It is widely distributed and available everywhere. The operation system of hydropower is flexible

and in process no fuel cost is required. So as a whole we can say that hydropower is a new sector for energy development which can guarantee the supply of energy to the isolated rural areas of hill, mountain and Terai, and to the whole parts of country through national grid system.

In Nepal's case hydropower sector has been considered to be the corner stone of the employment generation and a safeguard to save nation from social and economic falls. The retrospection of the completed and on going hydropower projects and transfer of learning from those cases to the new, will pave the way to enhance better socio-economic status of people, society and nation as a whole.

The government of Nepal has adopted liberal policy in power development through issuing *Water Resource Act-1992*, *Hydropower Development Policy- 1990* and *Electricity Act- 1992*. After 1992, there has been the significant involvement of private sector in hydropower development. But how much have the private investors been contributing to the overall development of the country? It needs to be assessed. Since Khimti I Hydropower Plant is owned by private sector, here this research attempts to dig out the truths regarding the impacts of the project in the catchments area. In this perspective, perhaps the pioneer attempt, to analyze the question (what is the socio-economic impact of Khimti I Hydropower Plant) related to the impact of the project needs no further justification for the study.

1.3 Objectives of the Study

The general objective of the study is to find the overall impact of Khimti 1 Hydropower Plant (KFHP) on social and economic settings of its periphery. The specific objectives of the study are:

- a) To find the social impact (education, health nutrition) of KFHP in the study area.
- b) To find the economic impact (income, expenditure, savings and employment) of KFHP in the study area.
- c) To make some relevant recommendations on the basis of SWOT analysis.

1.4 Rationale of the Study

Hydro-electricity occupies a very eminent place in the energy sector of Nepal. The utilization of energy is centered in urban areas, and most of the rural areas have been by-passed by these power development schemes existing in Nepal. Nepal is blessed with many small and large rivers numbering almost 6000 and favorable topography for hydropower generation.

In the hill and mountain areas almost all the households are found to consume traditional sources of energy for cooking, heating and the necessary activities. Kerosene is used for lighting. Firewood is also used for lighting and cooking. The energy demand can be expected to be high in the immediate future. However, rural activities can be diversified. The living standard can be raised through supply of electricity. The definite benefits 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 is possible which 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 to discover, develop, expand and promote new techniques and technologies in various sectors.
-) Electricity helps to develop infrastructures, which are preconditions for the economic development. Development of electricity and infrastructure has correlation with each other.
-) Improvement in extra-curricular activities can be ensured which help to raise the living standard of the people.
-) Electricity helps to improve overall sectors of the economy.

Energy is the fuel for development. In Nepal's context hydropower is a perpetual resource with abundant possibilities. But the national economy alone is not sufficient to harness this resource. So the government has adopted liberal policy in hydroelectricity development. The government's call for Public-Private Partnership (PPP) is a right policy to achieve goal in this sector. In this context, the study of a private sector owned 1st largest hydropower; Khimti 1 hydropower project, will be guideline for the other public as well as the private power producers,

policy makers, new investors in hydropower and the governments (local and central) to take right step in future projects.

1.5 Limitations of the Study

This research has been conducted for academic degree. The study is focused on the socio-economic impacts of the hydropower project in development of Nepal. Khimti 1 Hydropower Project (KFHP) has been taken as a case study in this research. The study covers mainly Sahare VDC of Dolakha district and partially Phulasi VDC of Ramechhap district. But as a whole, the study has tried to depict the socio-economic characteristics of Kirne basin of Sahare VDC and Devitar premises of Phulasi VDC.

The generalization derived from this study may not be equally applicable to other project. Due to the limited resources (Financial and technological) and time constraints, the study could not cover the overall catchments area of Khimtii 1 hydropower project. So the conclusion drawn from this study may not represent the entire efforts made by KFHP for neighborhood development and impacts of the programs launched. The expertise constraints may also pose limitation in making the study more impressive and relevance as desired.

1.6 Organization of the Study

The study attempts to dig out the overall impact of Khimti I Hydropower Project in the social and economic aspects of the people living in the project's catchments area. The whole study has been divided in seven chapters. Chapter I of the research report deals with the introduction part of the study. Chapter II explains about the review of the literature related to this study. Chapter III of the study shows the

status of hydropower in Nepal where as Chapter four is about the entire research methodology. Similarly Chapter V portrays the description of Khimti I hydropower project along with the socio-economic characteristics of the study area. Chapter VI is about the overall impact of the project on the social and economic aspects of the people living in the study area. The last Chapter (Chapter VII) deals with the summary, conclusion and recommendation of the study.

CHAPTER II

LITERATURE REVIEW

Limited researches have been conducted on socio-economic impacts of private sector owned power plants especially medium scale hydropower projects. Generally, the studies on medium and large- scale hydropower projects have been conducted to identify social, economic and environmental impacts created by the development of such projects. But this study has been carried out to outline only the socio-economic impacts of Khimti 1 hydropower project, a 60 MW power plant, and Nepal's first largest power plant owned by private sector. Many publications, reports, theses, dissertations, articles on journals, and newspapers which are related to the hydropower, are reviewed in this thesis. Those literatures which are closely related to this research have been reviewed as follow:

Pokhrel (2003), in his article "*Videshi Laganimathika Prashana haru*" has mentioned that Nepal government's proper policy and long-term plan of hydropower development are essential to fulfill national need and to export. If national capital and technology would be inadequate then government of Nepal should offer foreign investors to develop hydropower. Khimti (60 MW) is the first project invested by foreign companies under the *Electricity Act-1992*. He mentions that foreign companies are investing on hydropower generation by imposing their own terms and conditions that have led to bear very expensive cost being the second richest country of the world with respect to water resources. Applying PPA, NEA pays 42 percent of its total revenue annually for 15 percent of its existing total capacity (Khimti 60 MW and

Bhotekoshi 36 MW) that have been invested by foreign companies. Statistically, it has been seen that the Per KW and per unit cost of some projects that are launched by Nepalese private companies are cheaper than those projects launched by foreigners (completely or partially). He has suggested that government of Nepal should think over foreign investment for Nepal's hydropower development on time to provide electricity at cheaper rate, control environmental degradation, encourage local investment and skill, and to enhance the employment opportunities.

Thapa (2004), in his article "*Dobbar Vikas*" says that development of hydropower has been doubled in twelve years of restoration of democracy in comparison to thirty years of Panchayat. Statistically, existing capacity of hydropower is more than 563MW now. It was only 281 MW before twelve years. Per capita energy consumption reached around 60KW per year now. However, it was less than 20 KW at that time. Total number of customers has reached 970,000 from 290, 000 during that period. New liberal hydropower policy facilitated investors in the various cases then, private secretors has been attracted. It has resulted the development of the local industries, which has created the employment opportunities. Likewise, it has helped to raise the value of goods and services and has performed the integrated energy system of Nepal. And it has positive impact on overall economy and national capital. The new skill and knowledge acquired by technicians and the technologies have become applicable for the small hydropower plants. After the advent of new policy, private sector has generated about 145 MW electric in Nepal in this period.

'Water Resources Development: Nepalese Perspective', published by IDS in 1995 (study directors: **Thapa and Pradhan**), is a valuable book in this regard. They say that hydropower is Nepal's major resource endowment. Numerous attractive run-of-river and multipurpose hydro-schemes have been identified but remains underdevelopment. They explain the strategy of water resource development that saving in transportation cost, environmental benefits foreign exchange earning from large power project, agricultural industrial products and other modern manufacturing output to be stimulated by power supply. Small and micro-hydro potential remain virtually used in the hilly and mountain areas. Despite Nepal's small size, only about 10.5 percent of the total population has had the access to electricity (where as about 40% of domestic connections are concentrated in the Katmandu valley). The installed capacity of hydropower stations developed till then had worked out less than one percent of the potential identified up to that date. Nepal's energy scenario reflects an imbalance between energy consumption and energy resources endowment. Development of water resources is essential in order to meet human needs like increasing agricultural and industrial production, meet energy demand and earn foreign exchange from power export. They have pointed out that high investment requirement for the development of hydropower and lack of financial resources, are the major constraints at present.

"Water Resources Development on mighty Himalayan Rivers" (1990) written by **Bastola**, is another valuable book in this regard. He says that geographical and geological conditions of the country have given rise to such a river system in our system. It surveys that some of the cheapest hydropower stations can be developed in our country. 15 million MW hydropower potentiality of our country is so much greater compared to

our consumption. It can be exhaustible for our economic uplift. We must look for market, extend impetus for isolated hill areas, medium size projects to meet national demand in relation to entry, irrigating water supplies and large-scale projects primarily for export and securing navigation facilities from lower riparian to ease the difficulties by Nepal's landlocked status. Rivers are not only the ornaments of the country but also diamonds, if they are properly utilized by formulating a long term plan for its development. Fifth development plan (1970-1975) has shouted to distribute the benefits of social and economic development. High priority has been given in bringing rural electrification to the hilly regions. Economic activities are not sufficient over there. However, there are rivulets whose capacities range from 1 to 200KW.

"Jalsrotiko Barema Sunna Bujhna Parne Kuraharu" (2051 BS), is an important article, written by **Upadhyaya** about water resources of Nepal. He mentions that Koshi Gandaki and Karnali rivers are international level river. Total 244 MW hydropower had been installed till to that data. Nepalese people have been getting neither irrigation facility nor electricity adequately. India is taking more advantage than Nepal from large barrage, near to the border, of Nepal's large rivers. Out of the total land irrigated by Koshi and Gandaki irrigation projects, only 2.4 percent lies in Nepal and the remaining 97.6 percent in India. In other words, he suggests that we should research large water resources as USA did. It would be better to install small-scale hydropower projects from small rivers in the present context of Nepal. After we become capable to invest on our Own, we can install large scale projects at low cost by utilizing our large rivers. Alternative measure to develop hydroelectricity in Nepal at present context is to develop suitable small

and middle scale projects, which fulfill annual demand of electricity by utilizing available local resources. He suggests that people's participation is required to make policy for utilizing water resources as national resources.

Shrestha (1995), in his article "*Privatization of power sector in Nepal*" has mentioned that efforts of privatization in power development started in United States of America and United Kingdom since 1880s. Nepal is in its initial stage of privatization of the power sector after it brought out new and liberal *Water Resource Act-1992*, *Hydropower Development Policy-1992* and *Electricity Act -1992*. Private sectors' initiative and market oriented behavior are expected to improve the power sector and its performance and efficiency. The number of hydropower projects installed by private sector is increasing day by day. Rural people can not afford high electric tariff unless the government provides subsidies. Significant portion of cash flows out of the country as debt services and dividends that create the problem of deficit balance of payment and less attention towards environmental impacts are major demerits pointed out by Shrestha. On the other, power sector creates more employment opportunity, improves socio-economic condition of people, promote skill, encourage the investor, controls environmental degradation and deforestation, and assists the national economy which can be marked as the merits of privatization of power sector.

Gurung (2000) in his thesis "*Impact of Modikhola Hydroelectricity Project in Parvat district*" reveals that the total water provides nearly 25 percent of the world's energy. It is estimated that 73000 TWh can be generated whereas today the world has produced 3207 TWh hydroelectricity. Asia consists of 28 percent of the world's hydropower

potentiality. High run of potentiality of several rivers, and mountainous topography support to raise hydropower development in the context of our country. The study analyzes potentiality and historical perspective of hydropower development in Nepal. Major rives and small rives contribute 87 percent and 13 percent in theoretical hydropower potentiality of Nepal respectively. Total technically feasible hydropower potentiality is 45,520 mw from 93 project sites of different river basins. He also analyzes the suitability of development of small hydropower projects in Nepal. He recommends that we should develop the small hydropower projects in the present context of Nepal.

Paudel (1996), in his thesis "*Hydroelectricity Development in Nepal*" has studied about the development of hydroelectricity during different plan periods and major projects. The water resource is essential for generating and reducing the import of expensive petroleum products. Hydropower projects seem to have brought some changes in attitude, behavior and habit, and awareness level of the local people. It has mainly contributed to transportation, market and communication facilities. The physical characteristics and rivers naturally affect Nepal's hydropower development activities and human interaction. He concludes that small hydropower plants, which may be the only means of rural electrification in the country, are viable at present.

Acharya (1983), in her thesis "*Hydroelectricity Development in Nepal and its contribution to Nepalese Economy*" mentions the contribution of hydroelectricity to Nepalese economy. It plays significant role by developing various fields such as agriculture, industries, transportation social services etc. Water resource is Nepal's greatest asset but unfortunately very insignificant portion has been harnessed to this date.

She says that there is unequal distribution of electricity in different development regions. Nepal is facing many problems with respect to hydropower development. These are lack of capital, skilled manpower, technical know-how, sufficient market and economic status of people as well as of country.

Upadhyaya (1975), in his thesis "*Electric power and its role of Economic Development of Nepal*" says that electricity is a substitute of oil and fuel wood. Electric power installation was started since 1911 A.D. in Nepal but motion of development activities was very slow. If we develop hydropower, it can be used in various sectors such as ropeway, trolley, streetlights, industries, domestic usage and so on. It plays significant role to reduce unemployment and poverty in the country. We can produce more goods having high quality at low cost by using electricity. We can earn more foreign exchange by selling electric power. Definitely, it will help to regain favorable trade balance and balance of payment. Development of electricity really brings economic revolution in the country. Increasing demand of electricity is encouraging development of hydropower in Nepal.

Pokhrel (1998), has studied the current "*Status of Hydropower in Nepal and Impact of Jhimruk Hydroelectric Project*" the main objective of the study was to analyze the socio-economic impact of the project. The study was based on secondary as well as primary sources of information. The study has concluded that the project brought negative as well as positive impacts. Although there has been reduction in the flow of water down stream and thus has reduced agricultural production, raised the temperature of water, laid off some fishermen from their traditional occupation. The project, in fact, generated

employment, promoted skill and increased access to piped drinking water. Above all the project raised literacy through programs. The study recommended that the feasibility study and the action plan for mitigation of environmental problems resulting from the implementation of the project has not been properly considered and taken care of. The mitigation measures should have been closely monitored probably with the local NGOs or pressure groups. Thus it is recommended that mitigation measures have to be closely monitored and hydropower projects in the future should make the short coming of the Jhimruk project a lesson to be learnt.

Water and Energy Commission Secretariat (WECS) 1988, prepared the final report of the task force on rural electrification and impact on Nepal. The main objective of this report was to investigate the impact of rural electrification. The study gathered data from NEA. The major finding of this report is that the impact of rural electrification has been nominal. But this does not mean that there is no future for rural electrification. Rather it means that development of it in rural areas can be possible.

A study done by *East Consult* in (19990) has analyzed the socio-economic impact of MHP plants on rural economy of Nepal. This study is more related to the issues of mill ownership and management performance such as mechanical agro-processing and its impact on both inferences and consumers. According to the findings of this study the electricity from micro hydro turbines is useful only for compact settlement users of mill sites and not to scattered villages of Nepal, where transmission out might benefit. It has provided psychic and indirect benefits and has been made the community more attractive for

transient such as trekking but the economic productively can not be expected if it is not productive. Tariff collection problem, lack of knowledge in operating and maintenance, and unauthorized use of electricity are identified problems in the side. The rural people have no cash income to pay the electricity tariff. So it is very much difficult for them. The report duly forwards some important recommendations regarding the prospect of further development of such plants. It suggests that the poor people should be integrated with income generation activities. The manufacturers should reduce the operation and maintenance services costs to assist the mill owners in properly operating their machines. The study concluded that private entrepreneurs within the community provides cheap and better service than a private owner from outside community so the private owner from the same community should be further encouraged to expand the service to other areas of the country.

Pokhrel has studied "*Large- Scale Resource Devolvment Projects and the Problem of Displacement, Compensation and RSettlement with reference to the Kulekhani Hydroelectricity Project in Nepal.*" The study has been based on sample survey to collect needed primary information. The findings have been summarized under procedural and substantive groups. In procedural findings, the displaced households were given a choice between cash compensation equivalent to the market price of their lost property or land in the Terai area of the country. The displaced community took cash compensation and resettle on their own choice in various parts of Makawanpur district. Violent incidents had occurred with one particular community during the land acquisition. Police force had to be used to pacify them. There was a delay in distributing compensation, particularly the compensation which

had to come from the road department. The information given to the displaced was not adequate. Many left their dwelling places in a state of confusion. The local people's representatives were not included in the process of compensation planning. There had been no assessment of the loss of communal facilities and the decision was imposed by the project. In substantive findings, the cost compensation policy implemented in the Kulekhani project was designed on a least cost basis. It was intended to incur the least financial burden on the national government. The policy was concerned with protecting the interest of the majority (national population) while the interest of the minority (displaced) was ignored. Successful completion of the project was the major concern of the planners. As such, the question of equality in sharing of benefits and costs did not receive adequate consideration.

A research report published in **1993** entitled with "*Study on New and Renewable Energy Source*" prepared by **UNDP** has analyzed the situation of new and renewable energy sources in Nepal. This study is based on the survey covered in some districts in the central and western development regions areas normally hills and mountains. This study depicts the status of new and renewable energy sources viz. small and micro hydropower, water turbines, biogas, solar and wind power. The study has assessed the potentiality of these sources and also identified the area which needs further development. The study covers out with the conclusion that most of hydropower stations are either operating under-capacity or generating inadequate electricity to meet local demand due to insufficient water flow in the rivers during the dry season to generate electricity in full capacity and in some colder areas, operation of the plant is often hampered by formation of ice in the intake and frequent breakdown of canal and electromechanical parts. Thus the study

concluded that the hydro-projects run effectively only for about 9 months in a year. According to the study, the main constraints in Nepal are the absence of competent autonomous body to establish effective linkage and co-ordination between affiliated organization to monitor and evaluate programs and preference, the lack of adequate data base related to micro hydro project, resources and high cost of water turbines. It also suggests that government should provide facilities to local entrepreneurs and communities to set up new and renewable energy sources (NRES) and there should be revision of financial support through subsidy in initial investment, back financing on working capital, channelization of donor and resources to promote healthy growth of NRES technologies. Further there needs to be the integration of cottage industries, rope ways and other income generating activities as a means of improving load factors and viability of isolated hydroelectricity.

Pandey puts forth his views on community rural electrification in his article '*Rural Entrepreneurship through Electrification*'. According to him, government of Nepal (GoN) from the very beginning has realized the major role of electricity in the overall development of country and has emphasized 'rural electrification' (RE). In Nepal rural electrification was top down supply driven activity and could not couple with development of energy because the development of energy needs marketing innovation and key marketing of energy development is extension of Rural Electrification. Bilateral donors and banks had supported it but it is running very sluggishly. It has created a major challenge for GoN & NEA. Experiment on different project approach was not able to meet the growing demand with the population growth and more than that could not develop entrepreneurship in rural community. He further says that the general perception among the

personnel about NEA is that the subsidized electricity to commercial and industrial segment and high power purchase rate from independent power producers (IPPs) is also cause of poor financial health of NEA and result poor maintenance especially, of rural distribution infrastructure and lower rate of capacity addition in supply system. This triggers dissatisfaction to consumers being unable to meet community growing demand. This way, government, NEA and public all are discouraged. The result of such “poor rural power distribution in rural areas” has been a condition where everybody is at felt and every body looses. Hence, demand driven RE with new technology envisages for reduction of operational cost of NEA through managing people with development of entrepreneurships in rural area to build up better product and quality of electricity services offered in win-win situation to the public and utility both. He concludes, with these views, now encouraging rural community participation through the process of “Community Rural Electrification’ has been adopted since 2003. this innovative approach brought with an idea of involving the rural communities with their commitment first in cash into getting power from the grid and taking care of the system themselves by handling over responsibility of “Rural Electrification” (RE) and local management for energy distribution.

CHAPTER III

STATUS OF HYDROPOWER IN NEPAL

3.1 Introduction

Nepal is endowed with the total hydropower potential of 83,290 MW of which technically feasible capacity is about 45,000 MW and 42,000 MW is considered as economically feasible potential. Potentially Nepal could be a larger power producer and exporter to neighboring countries. But the present total installed capacity of the country is nearly 618 MW which is merely around one percent of the potential.

3.2 Potentiality of Hydropower in Nepal

3.2.1 Theoretical Potentiality

Theoretical potentiality of hydropower is estimated on the basis of hydrological and topographical conditions of a given territory. The theoretical hydropower potentiality is divided into three categories : rivers i) with catchments area equal to or greater than 1000sq. km as major rivers (ii) rivers with catchments area from 300 to 1000 sq. km. as small rivers and (iii) the rest with less than 300 sq. km. catchments area as rivulet/streams. Theoretical potentiality of hydropower of our major rivers like Saptakoshi, Saptagandaki, Karnali and Mahakali and other southern rivers is shown in the table below.

Table: 3.1**Basin wise Theoretical Potentiality of Hydropower in Nepal**

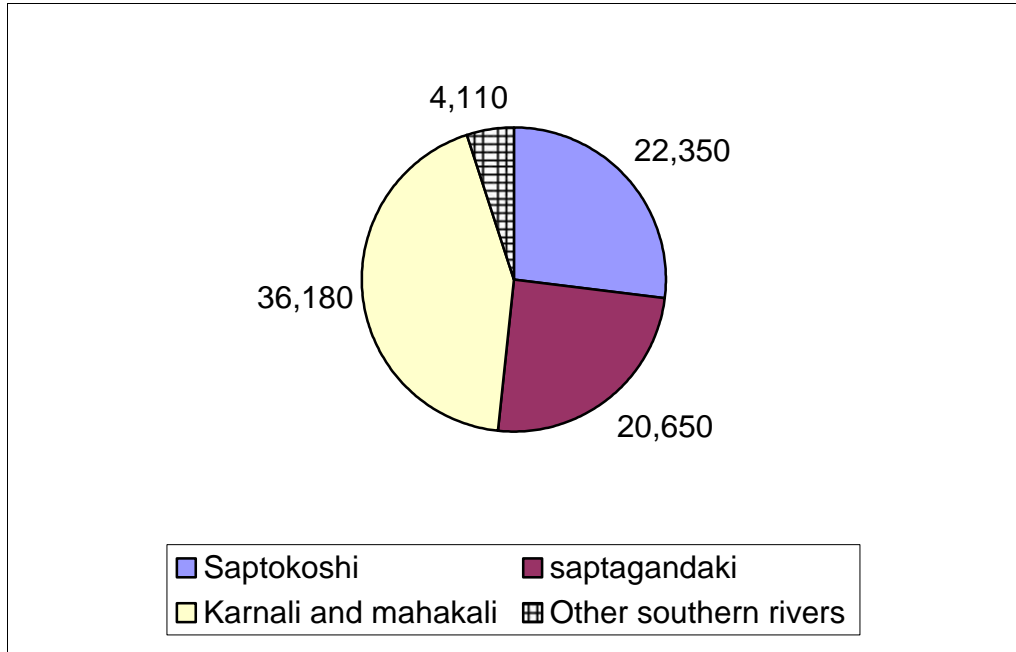
S.N.	River Basin	Major rivers		Small rivers		Total Potential in mw	Potential of Basin slop in mw
		Mw	%	Mw	%		
1.	Saptokoshi	18,750	22.51	3,600	4.32	22,350	33,400
2.	Saptagandaki	17950	21.55	2,700	3.42	20,650	29,000
3.	Karnali and Mahakali	32,680	39.23	3,500	4.20	36,180	56,500
4.	Other Southern Rivers	3,070	3.69	1,040	1.25	4,110	8,500
5.	Total	72,450	86.99	10,840	13.01	83,290	127,400

Source: WECS "Perspective Energy Plan" Supporting Document No. 2
MOWR, G/N Kathmandu 1995.

Nepal's total theoretical hydropower potentiality is 83,290 mw. The theoretical hydropower potentiality of major river courses and small river courses are 86.99 percent and 13.01 percent respectively. The Karnal and Mahakali have the highest theoretical hydropower potentiality (43.44%). Then come Saptakoshi (26.83%) and Saptagandaki (24.79%). Lastly, southern rivers, which originate from Mahabharat range, have the lowest (4.93%) potentiality.

Figure 3.1

Basin wise Theoretical Potentiality of Hydropower in MW



3.2.2 Technical Potentiality

Technical potentiality of hydropower is assumed on the basis of technically viable and possible sites to generate electricity. To generate hydropower, technically feasible sties are limited in number so total technical potentiality of hydropower generation is limited in comparison to theoretical potentiality. The total number of technically feasible hydropower sites is 93.

Table: 3.2

Basin wise Theoretical Potential of the Main Rivers in Nepal

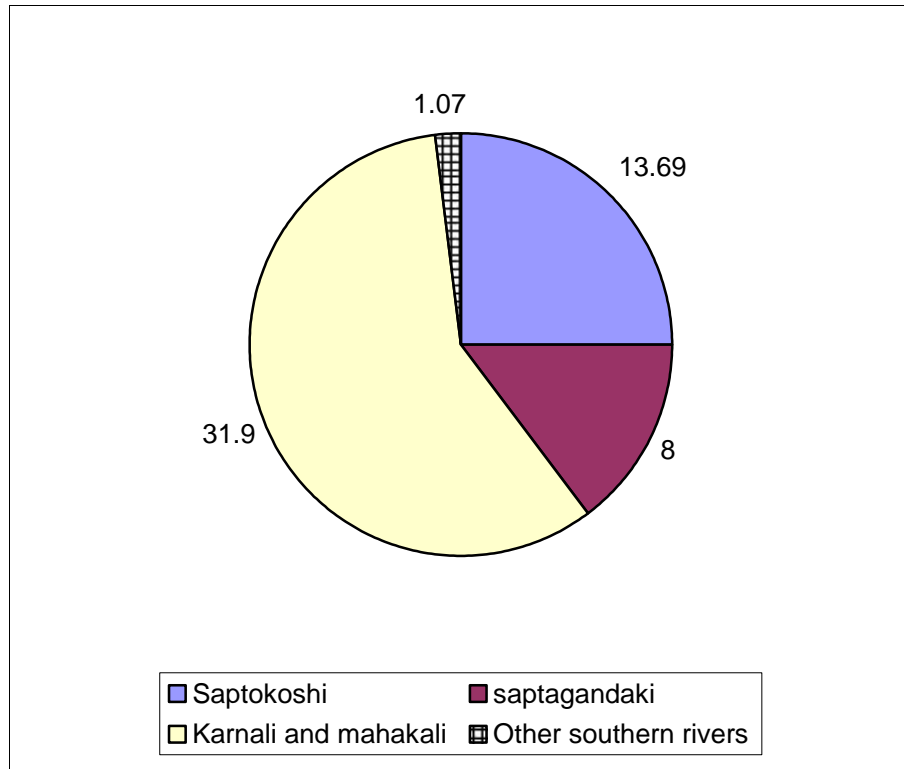
S.N	River basin	No. of identified sties	Technical capacity	% of theoretical potentiality
1.	Saptokoshi	53	11,400	13.69
2.	Saptagandaki	13	6,660	8.00
3.	Karnali and Mahakali	18	26,570	31.90
4.	Other Southern Rivers	9	890	1.07
5.	Total	93	45,520	54.66

Source: WECS "Perspective Energy Plan" Supporting Document No. 2 MOWR, G/N Kathmandu 1995.

The above table shows that the total technical potentiality is 45,520 mw which is 54.66 percent of theoretical potentiality of hydropower in Nepal. Saptakoshi consists of the highest number of technically feasible sites. It consists 53 sites (57%) out of total 93. Karnali and Mahakali hold the second highest position. It consists of 18 sites (19%) out of the total. Then, Sapta Gandakii and rest southern rivers have 13 sites (14%) and 9 sites (10%) out of the total respectively.

Figure: 3.2

Basin Wise Technical Potential of the Main Rivers in Nepal



3.2.3 Economical Potentiality

Economic potentiality of hydropower is assumed on the basis of economically viable or feasible sites to generate hydropower. Economic potentiality of hydropower is limited in comparison to technical and theoretical potentiality. Only 51 percent of total theoretical potentiality is economically viable likewise, only 66 sites are economically viable.

Table: 3.3

Basin wise Economical Potentiality of the Main Rivers in Nepal

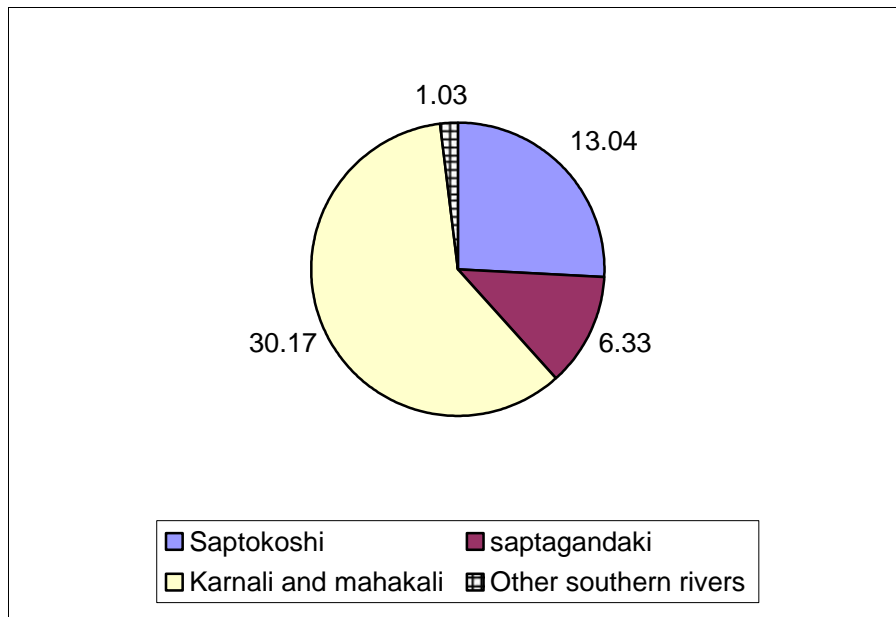
S.N	River basin	No. of identified sties	Economical potential	% of Theoretical Potentially
1.	Saptokoshi	40	10,860	13.04
2.	Saptagandaki	12	5,270	6.33
3.	Karnali and Mahakali	9	25,125	30.17
4.	Other Southern Rivers	5	878	1.03
5.	Total	66	42,133	50.59

Source: WECS "Perspective Energy Plan" Supporting Document No. 2
MOWR, G/N Kathmandu 1995.

From the table, economically viable total hydropower is 42,133 mw. Karnali and Mahakali rivers have the highest capacity (25,125 mw) of the economic potentiality. It contributes 59.63 percent. Saptakoshi and Sapt Gandaki are in second and third positions respectively with respect to economic potentiality. 40 sites have been identified out of total 66) in Saptakoshi which occupies 60.60 percent of all sites. Similarly, Sapt Gandaki and , other southern rivers are in second and third potions with 12 and 9 sites respectively.

Figure: 3.3

Basin wise Economic Potential of the Main Rivers in Nepal



3.3 Present Status of Hydropower in Nepal

All districts of Nepal have access to electricity. Total 617.380 mw electrically has been generated up to the end of FY 2007/08. Out of total electricity, the contribution of hydropower is 91.33 percent (563.870 mw from 68 hydropower projects) diesel is 8.65 percent (53.410 mw from 2 stations) and solar 0.02 percent (100 kw from 2 stations) . The contribution of private sector is 27.73% (156.340 mw) to the total hydropower generation. Besides the existing hydroelectricity there will 436,366 mw more hydropower be added to the existing power system by 2013/14 A.D. Out of 436.366 MW, 423.40 mw will be generated from public investment and the rest will be from private sector. This scheme includes Upper Tamakoshi Hydropower Project. Similarly, preliminary works are in progress to generated total 355.004 mw including 300 mw upper Karnali, through public private partnership (PPP) and 55.004 mw from independent power producer (IPPs). Other

projects, to generate 2540.079 mw (1025 mw from public investment) are planned and proposed which includes the biggest projects like Seti West (750 mw) from private sector and Budhi Gandaki 600 mw from public sector.

Though the rate of additional hydroelectric generation is very slow, the demand of electricity has been increasing. The total sale of electricity is 2,348.91 GWh which is 6.57 percent more than of last year's sale figure. Internal sale has increased to 2,287.41 GWh from 2,127.33 GWh of last year. The increasing rate is 7.52 percent. But the export to India has been decreasing since 2003. It has been decreased to 61.50 GWh from 76.87 GWh of last year's figure. The decreasing rate is around 20 percent. The total number of electricity consumers has been reached 15,24,610 which was 13,97,813 last year (in the year 2007). It's been increased by 9.07 percent. The sector-wise consumption in FY 2007/08 reveals that the domestic category accounted for 95.66 percent (1,45,841 customers) industrial category 1.67 percent (9,25,498 customers), commercial 0.43 percent (6597 customers) and non commercial 0.7 percent (10,639 customers). But of the total sale, domestic, industrial, commercial and non-commercial sales were 40.52 percent, 38.81 percent, 6.78 percent and 4.64 percent respectively, and their contribution in total revenue is accounted for 40.66 percent, 35.93 percent, 9.21 percent and 6.44 percent correspondingly.

Whatever the figure of power availability and hours of load shedding, the interest and urge on hydropower development have been increasing rapidly day by day. The involvement of private sector alone and its involvement in public private partnership (PPP) is very meaningful and encouraging. Besides this, the generation cost of hydropower launched by private sectors is comparatively lower than that of public projects.

CHAPTER IV

RESEARCH METHODOLOGY

4.1 Research Design

This study is carried out on the basis of descriptive cum exploratory research design. The study has been focused to investigate the impacts of KFHP on social and economic dimensions of the people living the catchments area. The study mainly has tried to reveal the status of people regarding education, health, nutrition, income expenses, savings and employment. At the same time, it has studied the statuses of people comparatively before and after the implementation of the project.

4.2 Universe and Sampling

The catchments areas around the project especially ward no. 4 of Sahare VDC and ward no.1 of Phulasi VDC is the universe of the data of this study. There are altogether 272 HHs in those two wards but only 25% i.e. 68HHs out of the universe have been sampled for the study. Quota sampling has been followed by random sampling procedure. A pilot survey was conducted in the study area before the sampling procedure.

4.3 Nature and Source of Data

Both primary as well as secondary sources were used for data collection. Primary data were collected through field work where as secondary data were collected through published and unpublished materials from different sources like, NEA, DED, MOWR, HPL, KPS, KSPL, KREC, KiND and the offices of VDCs, DDCs in Dolakha and Ramechhap districts.

4.4 Data Collection Tools and Techniques

Various tools and techniques were coined for the collection of data. The brief description of each has been given below.

4.4.1 Observation

Among the primary tools of data collection observation was made throughout the field survey. It started right from the first day to the catchments area and continued during the field visit. It was devised to get information regarding infrastructural development, health and sanitation, kitchen gardening and women empowerment. The events were recoded in the observation note book and the information received has been analyzed here with the data collected through other tools.

4.4.2 Interview

An interview schedule was prepared and used. It was prepared in such a way that it provided both the qualitative and quantitative data. There were two interviews; one with women representative and another with a teacher. Both interviews were designed to outline the effectiveness of the activities carried out by KFHP, the respondents' response toward the project and the overall impression of the project in the study area.

4.4.3 Focus Group Discussion

To facilitate the qualitative data collection method, this tool was used. There were altogether three FGDs through the field visit; one with women, another with students and teachers of a nearest government school (Shree Trikuteshwor Lower Secondary School) and the rest with the students of Tamakoshi Janajagrita College Khimti. The all FGDs were designed to explore the impacts of Khimti 1 hydropower plant.

4.4.4 Questionnaire Survey

A structure questionnaire was developed prior to field visit. The questionnaire was designed in such a way that it covered the programs/activities of KFHP, the impacts of those activities, new areas for KFHP to work in and the exact targeted group/community.

4.5 Data Analysis

Secondary as well as primary data have been presented in the tables. Moreover, Pie-charts, simple bar diagrams, sub-divided or component bar-diagrams and multiple bar-diagrams have also been used to analyze the primary as well as secondary data. The data are analyzed quantitatively, qualitatively and cartographically where necessary.

CHAPTER V

SOCIO-ECONOMIC CHARACTERISTICS OF THE CATCHMENTS AREA OF KFHP

5.1 Introduction

Khimti I is currently the largest private hydropower plant in Nepal with an installed capacity of 60 mw. **Khimti I** represents about 10% of the total installed capacity in the power system and contributes approximately 350 GWh a year. The plant is situated in Krine basin of Sahare VDC in Dolakha district. It is about 175 km away from the capital city Kathmandu towards east. The plant is at the bank of Tamakoshi River exactly at 86^o 06' 25" E longitudes and 27^o 29' 13" N latitudes and the study area lies 3km around the project site. The project construction had begun in 1994 and started its commercial operation on 11th July 2000. Himal power limited (HPL), a company registered in Nepal is the owner of KFHP. There are five main owners of Himal power limited (HPL); SN Power (50.4%) , BKK(923%), bpc (Butwal Power company 14.9%), ALSTOM(5.84%) and GE energy (5%), and rest share is of Nepalese individuals.

Besides, hydropower generation, KFHP has done a lot for the neighborhood development. It has been working in infrastructure development for education, irrigation, drinking water, health, sanitation and environment. To achieve its goal in community development, the project has been supporting schools in the project affected area, investing to irrigation canals and rural electrification. On the top of these things, the project has been consistently working for the neighborhood development with its direct and substantial involvement through

establishing its sister organizations. The followings are the directly HPL-assisted organizations for the community development running in the study area.

5.1.1 Khimti Project Clinic

This clinic has been running under Khimti Services Private Limited (KSPL), a main service provider to HPL, it's been giving service right from the construction phase. It provides free medical check-up facility and sales medicines at 50% discounted rate. There is 24 hours emergency ambulance service. The local people (community people) have to pay NRs. 14 per km for the ambulance service. The clinic also provides financial support to very poor patients through Medical Care Fund. The yearly report 2064/065 B.S. of clinic reveals that there were altogether 14501 patients who had visited clinic. Out of those, 1152 were community people, 609 were Nepalese army and 2740 were the staff. There was a patient under DOTS program. The Clinic also organizes the awareness programs on the important occasions like World Environment Day, World AIDS Day and World TB Day. The clinic area has been maintained very neat and clean.

5.1.2 Khimti Project School (KPS)

Khimti Project School (KPS) is another organization assisted heavily by HPL. The school was founded for the children of project staff initially but the present students' ratio shows around 20% students are from project staff and 80% students come from the community. HPL has set up a very good infrastructure for the school. There are more than 450 students enrolled in KPS. It is a good example of community development. However the fee structure and free ship/ scholarship

scheme have been continuously criticized by the poor, vulnerable and marginalized communities. The school was established in 2050 B.S. and the project wants to keep the support continue in the years to come which has been clearly stated in the HPL's annual report 2007.

5.1.3 Khimti Neighborhood Development (KiND) Project

UNDP and Himal Power Limited (HPL) have launched a partnership project (2007-2010) to increase electricity access to villages near the Khimti Hydropower plant site. The project is being implemented by the alternative energy promotion centre (AEPC), a government body under the overall framework of another UNDP- assisted project called the rural energy development program. The KiND project will supply electricity to about 3100 hither to marginalized households by constructing a 450 kw mini-hydro power plant and establishing rural electrification and distribution grids. At the same time, various initiatives will be undertaken to build essential infrastructures to promote local entrepreneurship and foster community development. KiND will support the institutional capacity of the Khimti Rural Electric Cooperative (KREC) to ensure the sustainability of the hydropower based community development.

This \$ 3.85 million project, \$ 200,000 of which is contributed by UNDP and the rest by the government of Norway and Himal power limited, is expected to improve the standards of people living in the households of 10 village development committees spread over Dolakha and Ramechhap districts. KiND can be called the reincarnation of JREDP II. It will continue the development programe like JREDP. The development efforts such as education support, irrigation and drinking water improvement, rural electrification to 3100 more households,

income generation training and women's empowerment will be continued.

5.1.4 Jhankre Rural Electrification and Development Project (JREDP)

JREDP is a phase out project. It was launched in 2053 B.S. and completed by 2063 B.S. It was launched in two phases each of 5 years. So there were JREDP I and JREDP II. The second phase was financed partly by HPL (20%) and largely by NORAD (80%). The project has electrified 4300 households of 10 VDCs (six VDCs from Ramechhep and four VDCs from Dolakha districts) of the KFHP affected area constructing a Mini Hydropower Plant with installed capacity 635 KW. JREDP also worked in education, construction of development infrastructures, mitigation of environmental impacts, promotion of self employment for living standard advancement and, health and sanitation. Later, an electric cooperative, first in Nepal, called Khimti Rural Electric Cooperative (KREC) was established with the help of HPL and handed over the project to KREC.

5.2 Socio-Economic Characteristics of the Catchments Area

Khimti I Hydropower Project has a large area under its catchments. The project has 358 sq. km as its catchments area. There are a lot of households within this area but there are only 272 households in the study area and only 68 households are sampled for the household survey. So the data, table and graph presented here under this title is of 68 households only.

5.2.1 Population Distribution

The population of the study area is given according to sex and age. The table below presents the data as follows:

Table: 5.1

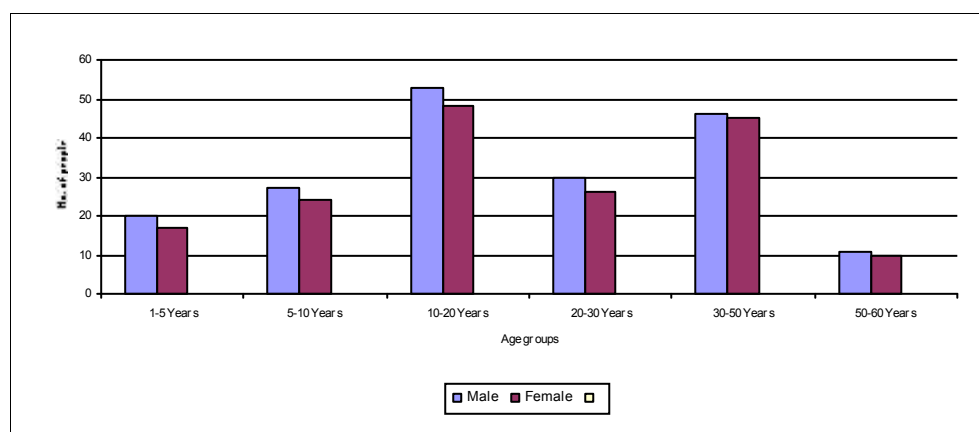
Demographic Status of the Sampled Household in the Study Area

S.N	Age in Year	Male	Female	Total	% of the total	Sex ratio
1.	1-5	20	17	37	10	117.64
2.	5-10	27	24	51	13.79	112.50
3.	10-20	53	48	101	27.30	110.41
4.	20-30	30	26	56	15.15	115.38
5.	30-50	46	45	91	24.60	102.22
6.	50-60	11	10	21	5.66	110
7.	60 above	6	7	13	3.50	85.71
Total		193	177	370	100	109.03

Source: Field Survey, Sep, 2008

There were altogether 370 people in the total 68 sampled households. Out of the total, male were 52.16% (193 male) and 47.84% (177 female) were female. The number of children below 10 yrs, found to be 23.79% and people over 50 years were 9.16% of the total population people of age 20-50 years are found to be 29.25% the data on the table is presented in multiple bar diagram below.

Figure: 5.1
Demographic Status of the Sampled Household in the Study Area
by Sex and Age



5.2.2 Population Distribution by Caste and Ethnic Group

There were altogether eight castes in the study area. They were Brahmin, Chhetry, Tamang, Newars , Giri , Puri, Bishwakarma and Nepali (so- called Dalits). The data has seen presented in the table below.

Table: 5. 2
Population Distribution of the Sampled Households by Caste/
Ethnic Group

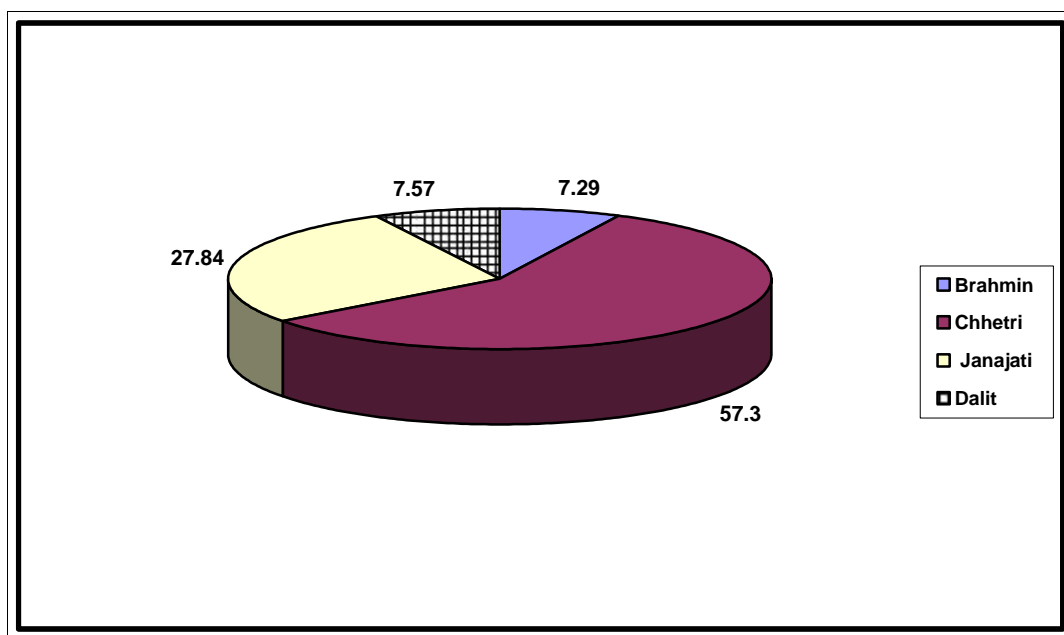
S.N.	Caste / ethnic group	Male	Female	Total	% of the total	No. of HHs
1	Brahmin	15	12	27	7.29	5
2	Chhetri	110	102	212	57.30	39
3	Janajati	52	53	103	27.84	19
19	Dalit	15	13	28	7.57	5
Total		193	177	370	100.00	68

Source: field Survey, Sep. 2008

The table reveals that the study area is mainly Chhetry dominated area. Out of the total population of the study area the share of Chhetry, Brahmin, Janajati and Dalit is 57.30 percent, 7.29 percent, 27.84 percent and 7.57 percent respectively . The data in the table is presented in pie- chart below.

Figure: 5.2

Population Status of the Study Area by Caste / Ethnic Group



5.2.3 Educational Status

Out of the total population 83.78 percent population is literate and 16.22 percent is population illiterate. The male and female literacy rate is 56.78 percent and 43.22 percent correspondingly. Among the male, 91.19 percent are literate and among the female, 75.70 percent are literate. The literacy status of the study area has been given in the table below.

Table: 5.3

Educational Status of the People Living in the Study Area

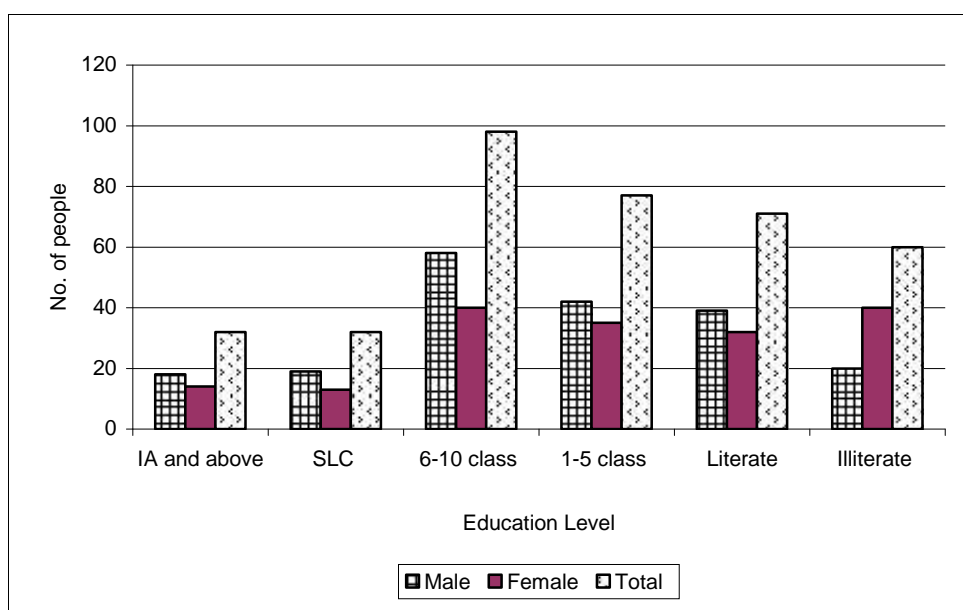
S. No.	Level passed	Male	Female	Total
1	IA and above	18	14	32
2	SLC	19	13	32
3	6-10 class	58	40	98
4	1-5 class	42	35	77
5	Literate	39	32	71
6	Illiterate	20	40	60
Total		196	174	370
Literate %		91.19	75.70	83.78
Illiterate %		8.81	24.30	16.22

Source: Field survey, Sep. 2008

The table shows that 24.30% female and 8.81% male are still illiterate. Among the literate people school going age children occupy the greater portion. The table has been presented in multiple bar diagram below.

Figure: 5.3

Literacy Status of the People Living in the Study Area



5.2.4 Occupational Status

Out of the total 68 sampled households , 38.25% households are found to have agriculture as their main occupation , similarly engagement of the households in government service , business, pottering and teaching have been found to be 14.7 percent, 3.82 percent, 4.4 percent and 2.94 percent respectively. Like wise, involvement of people in politics, foreign employment, carpentry and saloon as their main occupation is found to be 1.47 percent of each. The details of occupation status of the people of the sampled households have been shown in the table below.

Table: 5.4

Occupational Status of the People Living in the Study Area

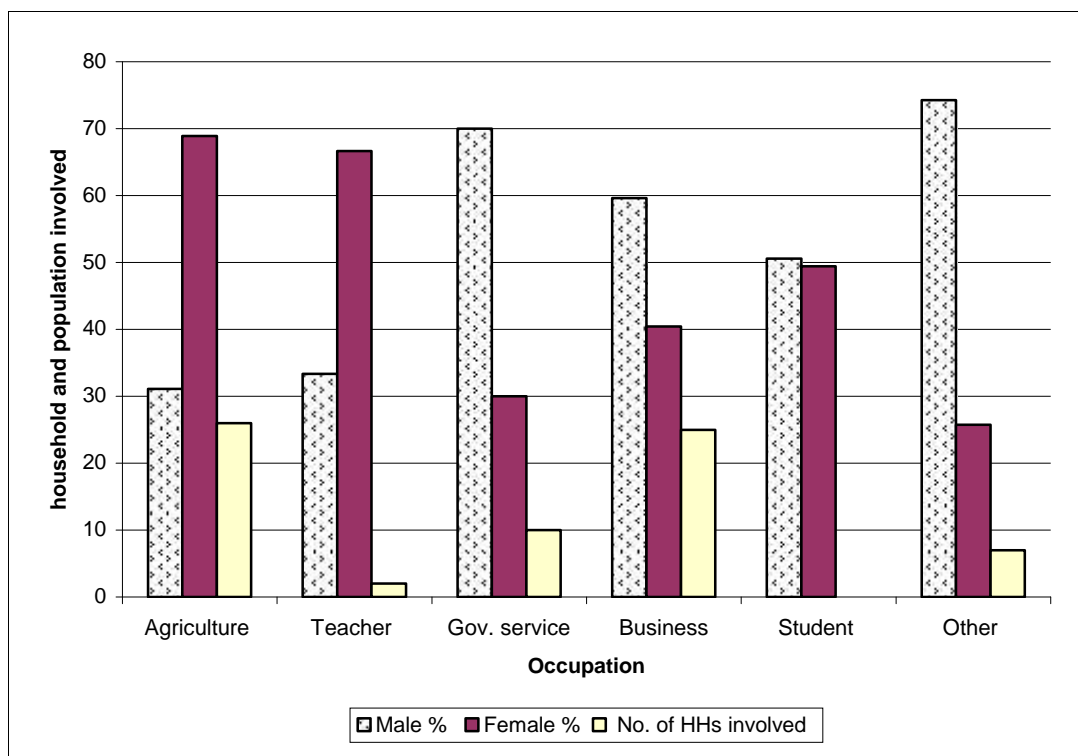
S.N.	Occupation	Involvement of male	Involvement of female	Total	Male %	Female %	No. of HHs involved
1.	Agriculture	28	62	90	31.11	68.89	26
2.	Teacher	1	2	3	33.33	66.67	2
3.	Govt. service	7	3	10	70	30	10
4.	Business	31	21	52	59.61	40.44	23
5.	Student	91	89	180	50.56	49.44	-
6.	Other	26	9	35	74.28	25.72	7
7.	Total	184	186	370	49.73	50.27	68

Source: Field Survey, Sep. 2008

The table shows that maximum number of households have agriculture as their main occupation and the involvement of women in this occupation is extremely high i.e. 68.89 percent whereas only 31.11% male are engaged in this occupation. In the overall occupational status, it seems somehow equal participation of male and female i.e. 49.73 percent and 50.27 percent respectively. The occupation in other category includes foreign employment, carpentry, saloon and politics. But nearly 50 percent of the total population seems to be studying in either school or in college. This shows nearly equal number of girls and boys going for the educational attainment.

Figure: 5.4

Occupational Status of the People Living in the Study Area



5.2.5 Income, Expenditure and Savings Status

Out of the sampled households 63.24% (total 43 HHs) have been found to have the habit of saving their surplus. Whereas 30.88% (21HHs) do have income and expenses in equal rate so obviously no saving is possible from those HHs however 5.88% (4.HHs) do have surplus but do not have the habit of saving or do not want to save their Surplus. 17 HHs, out of the sampled which have their income below than NRs 5000 per month are absent in saving. And only 11 HHs out of 19 HHs whose monthly income is up to NRs 9000 have been saving their surplus. Other 32 HHs whose monthly income ranges from NRs 9000 to more than NRs 20000 per month, have been saving their surplus. The details of income, expresses and saving have been present in the table below.

Table: 5.5
Income, Expense and Saving of the Sample Household

S.N	Description on monthly basis	No. of HHs having income	No. of HHs having expenses	No. of HHs saving surplus	% of the HHs among total	No. HHs that have no saving
1.	Less than 2 thousand	7	3		0	3 (no surplus)
2.	2-5 thousand	10	22	-	0	6 (no surplus)
3.	5-9 thousand	19	25	11	25.58	9 (no surplus)
4.	9-14 thousand	13	13	13	30.23	3 (no surplus)
5.	14-20 thousand	12	3	12	27.91	-
6.	20 thousand above	7	2	7	16.28	-
Total		68	68	43(63.29)	100.00	21+4*=25

Source: Field Survey, sep. 2008

The figure within parenthesis shows the percentage

*No. of HHs do have surplus but do not save it.

The table shows that out of the total only 63.29% households have been saving their surplus. There are 25 % households (17HHs) with monthly income less than 5000 which do not save at all. Out of those 17 HHs, 52.94% (9HHs) households have equal income and expense rate. So 47.06% households among the 17 HHs must have been living in debtless. Out of the total households which save their surplus, 29.91% (12 HHs) have been found to have saved their surplus in bank whereas 72.09% (31HHs) have found saving and Credit Cooperative as the option to save their surplus.

5.2.6 People's Trend towards Use of Loan

In comparison to saving trend, it seems just reverse. There were 63.27% (43HHs) households which do not borrow loan and 36.76% (25HHs) households are found to have been borrowing loans either from bank or HPL or KSPL (Khimti Services Private Limited) or Saving and Credit Cooperative. Among the households which have taken loan, 16% households (4HHs) have taken loan form HPL, 48% household (12HHs) have taken form saving and credit cooperative, 20% households (5HHs) have used loan from KSPL, 12% (3HHs) have borrowed loan from agriculture development bank (ADB/N) the rest 4% (1HH) has used loan from 'other' category. The details of use of loan have been given in the table below.

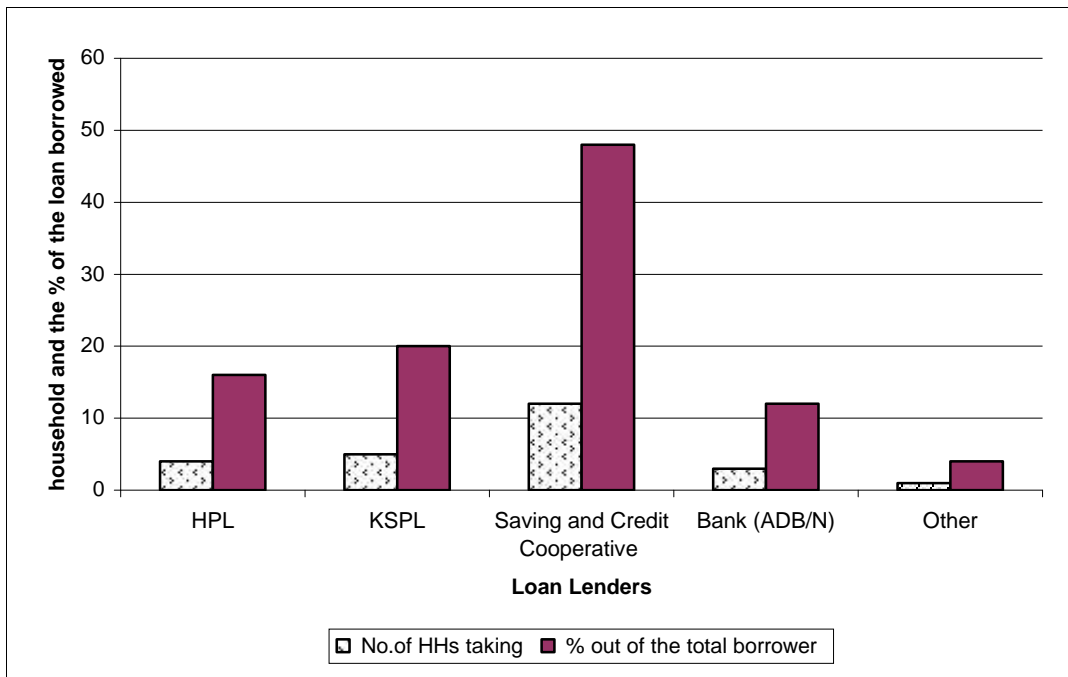
Table: 5.6**People's Trend towards Use of Loan in the Study Area**

S.N	Loan lenders	No. of HHs taking	% out of the total borrower	Reason for loan (why?)
	HPL	4	16	-Build house -Children's education -House repairing
	KSPL	5	20	-Land purchase -Treatment
	Saving and Credit Cooperative	12	48	-Setup biogas plant -Business -Household use -Land purchase -Farming
	Bank (ADB/N)	3	12	-Farming -land purchase
	Other	1	4	Household use
	Total	25	100	
	No. of HHs using loan	25	36.76%	
	No. of HHs not using loan	43	63.24%	

Source: Field Survey, Sep. 2008

The table shows that maximum loan has been used in land purchase and housing purpose. The trend of loan disbursement has been seen very nominal in the sector like income generation and self employment promotion activities. The 'other' category represents the landlords and money lenders in village level who are not the formal institutions just the elite people. And they may fix higher interest rate. The data in the table has been presented in pie-chart below.

Figure: 5.5
People's Trend toward use of Loan in the Study Area



5.2.7 Pattern of Use of Energy for Cooking

While studying the energy use pattern of the study area especially for cooking purpose, it is found that out of the total household 54.41% households (37HHs) have been still using fuel wood for cooking, 13.24% (9HHs) have started using electricity for cooking, kerosene and LP gas have been used by 4.36% household each. Likewise, there has been recorded a single household (1.47%) using Bio-gas for cooking purpose whereas 22.06% households (15HHs) have been using fuel wood and electricity both for their kitchen work. The details of the energy use pattern have been given in the table below.

Table: 5.7

Energy use Pattern of People in the Study Area

S.N.	Type of energy	No. of HHs using	% out of the total household
1.	Fuel wood	37	54.41
2.	Electricity	9	13.24
3.	Kerosene	3	4.36
4.	LP Gas	1	4.36
5.	Bio Gas	15	1.47
6.	Fuel wood + Electricity both	68	22.6
7.	Total	63	100.00
8.	No. of Household without electricity	5	7.35

Source: Field Survey, Sep. 2008

The table reveals that heavy dependency on fuel wood is still going on. Total 76.48% households (Fuel wood only 45.41% and fuel wood plus electricity 22.06%) have been depending on fuel wood for cooking. The table also shows that still 7.35% households are out of electricity facility. Only 92.65% household are enjoying with this facility.

5.2.8 The Availability of Drinking Water and Use of Toilet

It is recorded that 77.94% households (53HHs) among the sampled households have drinking water facility. However 22.06% households (15HHs) still lack this facility and are compelled to fetch water from the nearby river/stream. Another survey on use of toilet has revealed that there are 76.47% house holds out of the sampled, are using toilet whereas 23.53% households (16HHs) are absent in toilet using category . They have been using open spaces for the purpose which is contributing heavily in air pollution and various diseases especially in Devitar area (a market place in the study area). The data has been shown in the table below.

Table: 5.8

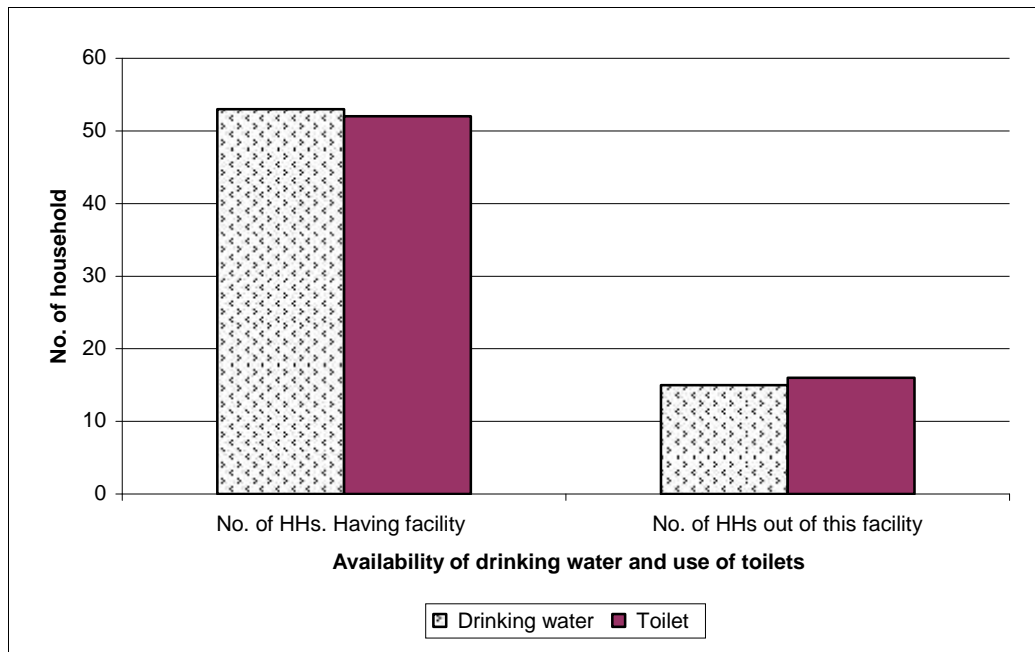
Availability of Drinking Water and use of Toilets is the Study Area

S.N.	Description/ category	Drinking water	% of HHs	Toilet	% of HHs
1	No. of HHs. Having facility	53	77.94	52	76.47
2	No. of HHs out of this facility	15	22.06	16	23.53
Total		68	100.00	68	100.00

Source: Field Survey, Sep. 2008

Figure: 5.6

Availability of Drinking Water and Use of Toilets in the Study Area



5.2.9 Land Ownership Pattern

The details of land ownership of the sampled households have been presented in the table below.

Table: 5.9

Land Holding Pattern of the Sampled Households

S.N.	Land in Ropani	No. of Households	% of the total HHs
1	Less than 5	6	8.82
2	5-10	9	13.24
3	10-15	8	11.76
4	15-20	10	14.70
5	20 above	14	20.59
6	Not available	21	30.89
7	Total	68	100.00

Source: Field Survey, Sep. 2008

From the table it is clear that out of 68 households , 8.82 percent have below the 5 Ropani , 13.24 percent have up to 10 ropani, 11.76 percent households have up to 15 Ropani , 14.70 parent have up to 20 ropani and 20.59 percent occupy more than 20 ropani. But 30.89 percent households have been recorded to be holding no land at all.

CHAPTER VI

IMPACTS OF KHIMTI I HYDROPOWER PROJECT IN NEIGHBORHOOD DEVELOPMENT

6.1 Introduction

It has been known that every hydropower project has positive and negative impacts on social, cultural and economic aspects of the concerned area and its surrounding. However this study has attempted to dig out the socio- economic aspects in-depth. But still a slight assessment regarding environmental impact, has been carried out on the basis of observation during the field visit. Khimti I Hydropower Project has influence various dimensions of physical and socio – economic aspects of human being in the project site and it's surrounding. It has direct and indirect and positive as well as negative impacts. It has following socio- economic impacts.

6.2 Impact on Infrastructure Development

The project has positive impact on the development of infrastructures. There was no road link to the project site before the project implementation. People from the existing project site had to walk for 4-5 hours to get the bus. Now a day, there is a 22 km long graveled road from Nayapul (a place in Dolakha district 153 km from Kathmandu to project site) to Kirne basin where the project is located. And this road further extends to the headquarters of Ramechhap district and goes on to different parts of Ramechhap. This was possible just because of the project. Besides the road construction, the project has contributed a lot in the development of infrastructure for education, electricity, irrigation

and drinking water. It has set up a school (Khimti project school) on its own investment. It has donated many schools around the catchments area to build the school buildings and toilets. The project has invested a lot in sanitation and drinking water through JREDP. It has constructed about 1000 toilets and water taps nearly at the same number. The project has set up a 635 kw mini hydropower plant to distribute in the project affected area. It has launched another pseudo project called KiND to continue the rural electrification program constructing another mini hydropower plant with capacity of 450 KW. Besides Haluwakhola irrigation canal construction, it has consistently assisting the irrigation canal in Miltikhola (A stream 3 km from the project towards Kathmandu). From these all noteworthy endeavors of Khimti I hydropower project, it can be concluded that the impact on infrastructural development is really propounding and substantial.

6.3 Impact on health and Sanitation

People of the study area are found to have been conscious significantly about their health and hygienic living habits. People have started to visit clinics and hospital, at initial stage of the disease, in stead of consulting witch doctors (Lama, Dhama, Jhankri). Mothers have learnt how to take care of their children. Numbers of contraeptic users has been increasing satisfactorily. All most all children are vaccinated. Most of the people have been using toilets. Quality of drinking water has been improved but all households do not have access to this facility. There is a clinic run by the project which not only provides medicine at 50% discounted rate but also organizes programs to create awareness about HIV&AIDS and STI, and environmental issues. Before the project implementation, place where the project exists now was just like a dry

land. There were stones and pebbles all around but now there has been developed greenery site. The road within the project site has been black topped. The project has distributed various nursery plants through JREDP to mitigate the environmental impacts. It has constructed more than 1000 toilets in the project affected area. A garbage collector tractor visits 3 days in a week and disposes the garbage at Bhorle site (a place about 500 m away from the project). But still Devitar (a market place 500 m away from project site) has not been Open Stool Free Area. It seems that something is missing in the project's endeavor to make the site neat and clean.

6.4 Impact on Education

People have understood the importance of education. No discrimination in sending the child to school is observed regarding a girl-child and a boy child. The literacy rate has increased. Even the people who were not the part of the formal education system had significantly participated in the non formal literacy classes run by Women Literacy Saving and Credit Cooperative Limited. The direct role of the project is not observed in this case but if the project would not be there, the women of this locality would not be empowered in such a short period and the cooperative would not be registered soon. So the project had indirect impact in that program. The students of the project area need not to go far away (especially to Kathmandu) for the quality education. Khimti project school has been rank as one of the best schools within Dolakha and Ramechhap district. The Project has assisted Tamakoshi Janajagriti College heavily to build the college building and to erect the matching fund for the approval of Bachelor's Degree program. This has definitely contributed a lot in the neighborhood development.

6.5 Impact on Employment

The project has created a significant employment opportunity to the local people. Many people were directly employed by the project during the construction period. There are three categories in the project organization HPL (core organization), KSPL (service provider to HPL) and KPS largely assisted by HPL and growing autonomous. Besides in HPL, ratio of employees from the local community is significantly high in other organizations. There are 120 staff in KSPL, most of them are local people. Likewise there are 27 staff in KPS and around 50% are from local community. There are two more organizations in the project site, KiND and KREC which are in the form of organization just because of project's continuous effort which has also created the employment opportunities in the project affected areas. Khimti I Hydropower Project has been the prominent body to create the employment opportunity around Kirne valley.

6.6 Impact on income generation and life style

It is observed that people's trend of subsistence level of production has been shifted to income generation activities. People have started poultry farming, off- seasonable vegetable farming and cash crop like coffee farming. They have started earning and re- investing their surplus to earn more. Loans are used for accelerating their earnings. The saving of the surplus and sources of new income like employment opportunity next to their door and sell of vegetable and livestock to the project staff and Nepalese army (There are around 100 soldier to protect the plant at Kirne) have brought some visible changes in the people's well-being . Most of the households have TV, Telephone and Radio which brings the life style of fast- track society directly into their mind. The scene of

youngsters wearing modern dress, a sixty year old man talking over cell phone and people being boozy by drinking Whisky and Gin, portrays the modernity cultured in their life style.

6.7 Impact on Settlement and Population

Before the project implementation there were hardly 20-25 households in and around the area where the project exists today. But now there are about 100 households around the project site. The settlement is clustered type. Kirne (a market place in Dolakha attached to project area) and Devitar (market place in Ramechhap district about 200 m away from project area) have been grown into main business centre for the periphery. Because of the flow and movement of people from the nearby villages, the population of the area has been tremendously increased. 30% households among the sampling were recorded to be with no land acquisition. May be this data shows the temporary migration of the people from the neighboring villages for the business motives. So what can be concluded is the project has not displaced any households but has been a key factor to transform scattered village scene into a clustered tiny town.

6.8 Impact on Youth and Children

Khimti I hydropower project has established a club called Khimti Staff club (KSC) which organizes various activities like games and sports, cultural program, academic programs like Poem competition, essay writing competition, quiz competition and such programs/activities directly or indirectly help children and youths . It is observed that youth and children of this area use their free time by going to the club and engaging themselves in sports like football, volleyball, cricket, table –

tennis, snooker etc. There is a gym centre for the youths too. The club also mobilizes the children and youths on World AIDS Day and World Environment Day which can bring positive impacts on them. The club has motivated children and youth towards disciplined life. The children are noticed good enough at conducting programs and raise their voice against child abuse and violation of their rights. But in some youths, it is noticed that they have been involved in drug addiction and some are found with negatively influenced by the life style of project staff.

6.9 Impact on Women Empowerment

A big project never comes alone. It comes with package. Exactly the same, Khimti I project had not come alone and only to generate electricity. Besides electricity generation, it had other obligations too. It had started neighborhood development programs through JREDP. In course of community development projects, it had conducted many programs especially targeting the women of the project affect areas. The some of the program were; bee keeping, hair cutting, literacy program for women, jam an juice making from fruits, cutting and weaving and fabric painting training etc. It also encouraged women for vegetable farming. These all activities have been found very instrumental for women to break the male dominance over them and to free themselves from four walls of their domestic prison. Now they have been members in Women Literacy Saving and Credit Co-operatives and have started saving on monthly basis. It is observed during the field visit that the women of the surrounding villages come to sell vegetable and fruits in Kirne and Devitar. The consumers of their products are mainly the project staff, Nepalese army and the residents of bazaar area. This is all because of the project. Khimti Staff Club organizes women volleyball

competition annually and 'Teej' song competition as well which provide platform for women to bring out their latent talent. It is also observed that many housewives who have TV at their house spend watching Tele serial. The credit goes to the project but the number of female staff in HPL and KSPL at site office is found to be very nominal which may hamper in the promotion of leadership skill in women.

6.10 Impact on Social Life of the People

The project has found to have brought may change in social life of the people. Right form the implementation of the project, the convergence of people from different back ground, interest and culture at a place, bought many modifications in the local people's lives. There were no Christians before the project, but the project along with its commencement brought Christianity and its practices in the local community this is because there were many staffs from western countries. Now a days people enjoy the 'Holi" (day of colors) but it was not celebrated in such a grand way before. Spouse of the project staff display their jewelry on 'Teej Day' which has negatively influenced the local women who do not have such jewelry to wear on. What it can be concluded is the project has brought many changes in social life of the people. New culture, new style has invaded the virginity of local culture and practices.

CHAPTER – VII

SUMMARY, CONCLUSION AND RECOMMENDATION

7.1 Summary

Energy is a basic requirement for development. The development of all the productive sectors of an economy depends on development of the energy sector. In general, there are two types of energy viz; traditional and commercial. Electrification creates various opportunities of development activities in rural areas. Traditional sources of energy are not sufficient to meet the energy demanded. The use of fossil fuel is also costly and it negatively pressurizes on the balance of payment in the economy. Over pressure on forest creates various problems.

This study attempts to appraise the importance of electricity in economic development. It also discusses about hydropower potentiality and its present status in Nepal and, impacts of KFHP on socio-economic condition of people in the area around the project.

Nepal has a great potentiality of hydropower. The theoretical potentiality of hydropower in Nepal is estimated to be 83290 MW on the basis of hydrology and topography. The technical potentiality of hydropower is accounted 45520 MW and the economically exploitable capacity of the country however is only 42133 MW.

The hydropower development in Nepal has a long history starting from the local water-mill known as *Ghatta*. The first hydropower plant was Pharping Hydro Project (500 KW) which was built in 1911 A.D. The government has been launching the development programs in

accordance with the economic plans. Every plan has given top priority to hydropower development for the holistic national development.

Before introducing the development plans, only 2.077 MW hydropower was generated in Nepal. But by the end of Tenth Five Year Plan, there has been altogether 563.870 MW hydropower generation including 27.73 percent (156.340 MW) of the total capacity by private sector in accordance with PPA. Kaligandaki-A (144 MW) is the largest hydropower project in Nepal till to-date. Out of the total hydropower, 558.194 MW has been linked in the national grid and rest (5.676 MW) is generated by small hydropower plants and distributed locally.

During the FY 2007/08, the electricity energy available for use within the NEA system accounted to 3180.66 GWh (Increased by 4.22 percent) and total sale was 2348.91 GWh (Increased by 6.57 percent) that that of the previous Fiscal Year. The total number of electricity customer upto FY 2007/08 has reached 1524610 (Increased by 9.07 percent). Consumption of domestic category is accounted 95.66 percent of the total consumption.

The Khimti I Hydropower Project is a run-of-river type project with 60 MW installed capacity, owned by Himal Power Limited (HPL) and located in Dolakha district of Janakpur Zone. It is one of the largest hydropower projects of its type (run-of-river) in the Central Development Region of Nepal till to-date. Moreover it is the first and the largest hydropower plant installed and owned by private sector in Nepal. The project was initiated in 1994 and had started its commercial operation on 11th July 2000. It has influenced various aspects of socio-economic dimension of human beings residing in the surrounding areas of the project. The project has devised the mitigation measures to reduce

negative impacts on environmental, physical, biological and socio-economic aspects.

The study area lies within 3 km from the project in its catchments area. The project has total area of 358 sq. km as its catchments which covers 10 VDCs (six VDCs from Ramechhap and four VDCs from Dolakha district). Through the field visit and HPL's annual reports, it's been found that the project has done a lot in the neighborhood development. The project is found to have been consistently providing financial support to schools and college, running the Clinic and Khimti Staff Club (KSC) on its own and subsidizing Khimti Project School (KPS) heavily. Besides this, the project is also found to have contributed a lot in community development through its pilot project JREDP which is phase-out and another project called KiND has been recently launched in partnership with UNDP to continue the programs of JREDP in achieving the goals of neighborhood development.

The data collected through household survey, observations, interactions and focus group discussion has revealed that the project has affected 370 people of 68 sampled households in the study area. Out of the total population of the sampled households male and female are 52.16 percent and 47.84 percent respectively. The share of the people of age group 20-60 was highest i.e. 45.41 percent and second highest share was of 10-20 year age group i.e. 27.30 percent, children's group below ten years contributed 23.78 percent in the total population and the rest (3.51 percent) was the share of the elderly people age above 60 years.

While studying the educational and health status of people living in the study area, it is found that 83.78 percent people are literate and 16.22 percent are illiterate. The data shows that women literacy is only at 43.22 percent whereas men literacy (56.78 percent) is higher than the national literacy figure that is 54.10 percent. If the literacy rate is studied among the gender only it is found that still 24.30 percent women are illiterate whereas only 8.81 percent male are to be literate. The maximum numbers of the students are found to be of school level. Out of the total 310 literate people 175 are studying at school. There are only 32 people who have passed IA and above level of education.

While analyzing the health and nutrition status of the people living in the study area, people are found to have been using toilets and the houses are with good drinking water facility. Out of the total households 76.47 percent are found with toilets however 23.53 percent households have no toilets and using the open space as their option to relieve themselves. Similarly 77.94 percent households have access to pure drinking water whereas 22.06 percent households are found to have been fetching water from the nearby stream/river which is obviously unsafe to drink. Likewise 72 percent married couple of the sampled households have been using contraceptive whereas 28 percent are found to have been using none of the means of protecting from unwanted pregnancy and HIV& AIDS and STI. Since the overall Purchasing Power Parity has been noticed to be increased, the calorie intake in the family has been increased. Among the sampled households there are 10.3 percent which take meal only twice a day, 61.76 percent take meal thrice a day and 27.94 percent take their meal four times in a day. And similarly, there are 73.53 percent households recorded who include meat in their food items at least once in a week. 86.44 percent of the sampled

households send Tiffin to their children at school. Likewise 55.88 percent HHs grow vegetable themselves but 44.42 percent HHs buy vegetable in the market. These all figures present the reality regarding the nutrition supply in the sampled families.

Many households in the study area are found to have agriculture as their main occupation. Besides agriculture, the record shows that people are engaged in business, government service, foreign employment, teaching, carpentry, saloon, pottering and politics. Out of the total sampled households, 38.23 percent are in agriculture, 36.76 percent are engaged in business, 4.4 percent in Pottering, 2.94 percent are in teaching and 1.47 percent is in foreign employment, politics, saloon and carpentry each. Out of the total population, 24.32 percent are engaged in agriculture and among the people engaged in this sector 68.89 percent are female and 31.11 percent are male.

There are 63.24 percent households who save the surplus whereas 36.76 percent do not have sufficient income so no saving is possible. At the same time, 30.88 percent households are found to have been spending more than 65 percent of their income on food stuffs. Among the people who save their surplus, 29.91 percent use bank and rest (72.09 percent) use Saving and Credit Cooperative for the purpose. Similarly, 36.76 percent HHs out of the sampled have borrowed loan whereas the number of the people who have not used loan are 63.24 percent. Among the loan users 16 percent has borrowed from HPL, 48 percent have used from Cooperatives, 20 percent from KSPL, 12 percent have taken from bank (ADB/N) and 4 percent has borrowed from the local landlords and money lenders. Very little amount of the loan has been found to be used for income generation and self-employment promotion. Where as

maximum amount of loan has been used in land purchasing, housing and household use. Based on the observations and analysis, fuel wood is found to be the prime source of energy supply in the kitchen. Dependency upon forest has not been decreased. Out of the sampled, altogether 76.47 percent households (54.41percent completely and 22.06 percent partially) are using fuel wood for cooking purpose. Though 92.65 percent households have electricity facility only 35.10 percent (13.24 percent completely and 22.06 percent partially) have been using it for cooking. Similarly, the users of kerosene, LP Gas, Biogas and electricity plus fuel wood are 4.36 percent, 4.36 percent, 1.47 percent and 22.06 percent respectively.

There were hardly very few persons who had involvement in social organizations and community based organizations. The involvements in such organizations and the economic activities of the people have been noticeably increasing since after the project implementation. Especially the participation of women in such organization has significantly increased. There are 55.88 percent people who have been involved at least in a social organization. But they seem to have been inadequately benefited from the skill development trainings. There are only 20.59 percent people who have got such trainings. However 79.41 percent people have been absent in those trainings.

People's increased level of income and affordability have helped them have access to means of communication. It is noticed through observations that people have assets like TV, Radio, Computer and Cell Phone in their room. The survey shows that only 10.29 percent of the total sampled households have no access to any of the above means of communication. But among the sampled households, 54.41 percent have

access to TV, 72.06 percent have access to Radio, 48.53 percent are with Phone and 10.29 percent have access to computer. Only few households are found to have all these assets however maximum households have at least anyone of those means.

The project has substantial impacts on women, children and youths living in the study area. The significant changes in people's life style can be noticed distinctly after the project implementation. Some people have adopted new religion and are found to have been practicing their new rituals. People have made some changes in their traditional practices. Something has been added to their culture and something from their culture has got substituted. For example, Holi Purnima (the festival of colors) has emerged in a new style which is neither been added not been substituted but just been revived with new way of celebration. Similarly, the English New Year has been added to the list of festivals in the study area whereas Birthday Celebration with cake and candle has substituted the Hindu rituals of celebrating it.

7.2 Conclusion

Khimti I Hydropower Project has a very noteworthy contribution in National Energy System. The government has announced 'Electricity Insurgency' in the country. But Khimti I shares 10.66 percent capacity of the total installed National Hydropower capacity (563.870 MW) up to FY 2007/08. This project alone has accounted 38.88 percent of the hydropower generated by IPPs in Nepal.

Despite being a private sector owned project, there are hardly few hydropower project that have contributed in neighborhood development to that extent as Khimti I Hydropower Project has. The project has been

found to have had deep and propounding impacts on the social, cultural and economic aspects of human life in the study area. A visible impact has been observed in education, health and nutrition of the people residing around the project site. The average literacy rate (much more higher than national average literacy rate) of the study area, the increased level of people's awareness, especially of women, regarding health and sanitation, and people's food habit and calorie supply resulting well-fed family are the credible indicators of the status of education, health and sanitation, and nutrition in the study area. Since the social profile of the study area before the project reveals that these indicators (education, health, nutrition) of Human Development were at subnormal stage. But what the community is today regarding those indicators is solely the contribution of the Khimti I Hydropower Project. However there remain some rooms for improvements to ensure the access of the poor, vulnerable, marginalized and socially excluded groups/communities to quality education, basic health and proper nutrition.

Because of the direct employment provided by the project, noticeable increment in self-employment activities, provision of income generation activities and the skill development trainings given by JREDP, NGO and Cooperative, the people's status in terms of income, expenses, savings and affordability, has been significantly increased. People have started to earn more. They invest and re-invest their surplus to generate more profit. This has increased the economic activities in the study area. The large share of vegetable farming is in women's hand/grip which has helped women be empowered themselves and reduce male's excessive dominance imposed upon them. The contribution of Khimti I project in economic aspect (especially in income, expenditure, savings and

employment) is quite distinctive. What and how the study area is today is just because of the project's endeavor. But this is not the saturation point. It's just a start. To drag the project affected community to the take off stage of social development, the project has to do a lot especially targeting women, children, socially excluded group, poor and the destitute.

Khimti I Hydropower Project has contributed a lot in nation building not only by generating energy but also being directly involved in community development activities. The project has a very good impression in the study area as well as in the national level. The contributions made by the project to the social, cultural and economic aspects of people living in the study area are much more effective and instrumental. The project can be taken as a good example in community development sector. It is an oasis of development in the region. But there is nothing perfect in the world and this project too can't be the exception to this truth.

Strong dedication to community development, commitment to environmental protection, qualified staff in right-size and trend of high annual profitability have been the key strengths of KFHP. However the lack of proper and timely monitoring, inadequate follow up, reluctance to review the development programs according to right-based approach and absence of programs focused for women, children, socially excluded, poor and vulnerable groups may pave the way for heavy criticism. But the project has people's support, favorable government policy in hydropower development (Public Private Partnership), supportive Union and the hardworking and dedicated staff as its opportunities for its sustainability. At the same time, the absence of

public ownership, frequent political interferences and strikes in the project premises, discrimination among the staff of the sister organizations regarding salary and facilities, lack of fore sightedness and the poor conflict management skill in the personnel may pose threats to the project operation and which may push the project in loss, in the long-run.

7.3 Recommendation

On the basis of the observations and analysis made, it is attempted to suggest in three levels; national level, project level and community level. The recommendations are intended to provide government with lessons learnt from KFHP, the project with some amendments that the project should make in its programs and the local people with some ideas that how they can help KHFP and get optimum benefits from the programs/activities of the project. The list of some recommendations is as follows:

-) Besides the favorable policies for the development of hydropower in Nepal, the government should ensure the conducive environment to invest in this sector.
-) Government should emphasize the development of infrastructure in remote hilly and mountainous districts which directly support the hydropower development.
-) While signing on the agreement paper with Independent Power Producers, the terms and conditions for the community development through significant people's participation should be ensured beforehand. For this, electrification in the project affected area should be carried out either by establishing separate

mini/micro hydropower plant or directly distributing from the main project.

-) The government should guarantee the public ownership in the project which will help minimize the everyday tension in the project area regarding strikes and much demand from the local communities. The government can set the strict and clearly defined criteria to ensure the people's ownership in the project operated in their neighborhood.
-) Khimti I project's efforts in the community development especially through investment in education, health, drinking water, irrigation and environment can be taken as the example and the government can encourage the other existing and upcoming IPPs to do the same at least in that level.
-) KFHP should include local people in its development programs as well as in the formal/informal activities like picnic, party etc which will help reduce the distance between the project and the local communities.
-) KFHP should assess its programs/ activities based on neighborhood development to know whether the program has benefited the target people/group or not. For example, it has been running Khimti Project School but there is not a single student who is from the ultra poor and the destitute family. Even the school's Free-ship/scholarship scheme has not been able to bring such a needy student in the school premises. Similarly, Clinic charges NRs. 14 per km for the ambulance service. A patient from very poor family can not afford it so it would be better if the MCF

(Medical Care Fund) bear the expenses. KFHP can help to raise the fund from which only the needy people can benefit.

-) KFHP should explore new ventures to work for the children, women, poor and socially excluded groups.
-) More focus, in the programs run by KFHP, should be given to income generation and self-employment promotion activities. It's been more than fifteen years of the project implementation but still some households around the project have not got the taste of development. There is no noticeable progress and changes in their lives.
-) KFHP should work in right-based approach of development. People will think KFHP great if it gives one lakh to their community school. They never think that it's their right to get education and KFHP has not done anything great but just doing its duty. So shift to right-based approach from need-based approach in its development programs will glorify KFHP's image in the catchment area as well as in the national level.
-) Lack of timely monitoring and adequate follow up should be avoided to make the programs effective and sustainable. There is need of post project evaluation. JREDP had constructed more than 1000 toilets and water-taps nearly in equal number but some water tap in the study area were found without water supply and some toilets were not maintained neat which is just like the distributing peanuts rather than teaching how to grow it.

-) Women participation should be given high priority in decision making and leadership skill development activities in the study area.
-) The local communities should be given top priority in employment opportunities.
-) Local people should also be ready and conscious to help the upcoming projects and programs and grab the opportunities.

In short, it is recommended that mitigation measures must be closely monitored. The upcoming projects should avoid the shortcomings of KFHP and the other existing project should try to follow the mantras of success learnt from Khimti I Hydropower Project. The government should facilitate the IPPs which will support its Public Private Partnership policy to develop nation through hydropower development.

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APPENDIX- I

Socioeconomic Impacts of Khimti 1 Hydropower Project A Case Study of Sahare VDC of Dolakha District

Questionnaire for Household Survey

1. Personal Profile

Name of the Family Head:.....

Age:.....

Sex:.....

Main Occupation of the Family:

How much land does your family have ?in Ropani

Does your family save the surplus?.....

2. Family Profile

S.N.	Name of the Member	Age	Sex	Education	Occupation	Involvement in any Organization	Training
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							

3. Income, Expenditure, Saving and Credit Status of the Family.

Description	Income	Expenditure	Saving	Credit
Less then 2 thousand				
2-5 thousand				
5-9 thousand				
9-14 thousand				
14-20 thousand				
above 20 Thousand				

4. Expenditure breakdown on monthly basis

Title	Expenditure
Food	
Education	
Health	
Fuel	
Clothes	
Miscellaneous	

5. Trend of use of financial institution

SN	Name of Financials	Saving	Loan
1.	HPL		
2.	KSPL		
3.	Cooperative		
4.	Bank		
5.	Other		

6. Availability of electricity, drinking water, toilet and assets

	Drinking water	Toilet	TV	Radio	Mobile/ Phone	Computer
Yes						
No						

7. Energy use pattern fro cooking

	Fuel wood	Kerosene	LP Gas	Electricity		
Yes						
No						

8 Health Status

Do you know about family planning?	ABOUT HIV/ AIDS and STI	Are your children immunized with :-	Did your children get vitamin 'A' capsule	Whom do you visit at initial stage of disease?
YES ☐ NO ☐	YES ☐ NO ☐	BCG ☐ DPT ☐ Polio ☐	YES ☐ NO ☐	Doctor Dhami Jhankri Lama Other

8. Nutrition Supply

Do you send Tiffin to your children ?	how many time does your family take food in a day	How many times does your family include meat in a week ?	Does your family grow vegetable or buy from market ?
YES ☐ NO ☐	2 times ☐ 3 times ☐ 4 times ☐	once a week ☐ twice a week ☐ Three times a week ☐ more than three times	Grow in land ☐ Buys from market ☐

