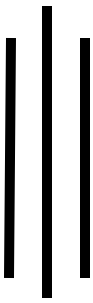
Socio Economic Impact of Hemja Irrigation Project

(A Case study of Hemja VDC of Kaski District)



A Dissertation Submitted to

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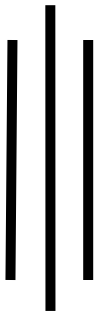
Patan Multiple Campus, Tribhuvan University

In the Partial Fulfillment of the Requirement for

Master of Arts

In

Sociology



By

Dilli Ram Banstola

2068

LETTER OF RECOMMENDATION

This dissertation entitled **Socio -Economic Impact of Hemja Irrigation Project**

(A Case study of Hemja VDC of Kaski District) has been prepared by Mr. Dilli Ram Banstola under my supervision and guidance. He has conducted research in March 2011.

Therefore, I recommend this dissertation to the evaluation committee for its final approval.

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LETTER OF APPROVAL

The Evaluation Committee has approved this dissertation entitled **Socio -economic Impact of Hemja Irrigation Project :A Case study of Hemja VDC of Kaski District** submitted by Mr. Dilli Ram Banstola for the Partial Fulfillment of the Requirement for the Master of Arts Degree in Sociology.

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September, 2011 Dilli Ram Banstola

Hemja-8,Kaski

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ABBREVIATION

ADB : Asian Development Bank

BC : Before Christ

CBS :Central Bureau of Statics

CDC :Curriculum Development Centre

DOI :Depart of Irrigation

DIO :District Irrigation Office

GDP :Gross Domestic Product

GON : Government of Nepal

INGO :International Governmental Organization

HIP :Hemja Irrigation Project

MOF :Ministry of Finance

NCA :Net Command Area

NPC : National Planning Commission

NRB :Nepal Rastra Bank

SLC :School Leaving Certificate

TU :Tribhuvan University

VDC :Village Development Committee

WUA :Water Users Association

WB :World Bank

CHAPTER I

INTRODUCTION

1.1 Background of the study

Nepal, a newest republic of the world is a landlocked country which is globally second for its water resources. It is situated between two Asian giants China and India. Its area is 1,47,181 sq.km and estimated population of 2010 is 2,8043,744 (CBS,2010). Topographically, Nepal consists mainly three ecological regions i.e. Mountain, Hill and Terai (plain) regions.

According to the Oxford English Dictionary 1985, Irrigation means the action of channels or streams, the distribution of the water over the surface of the ground through the artificial channels, in order to promote the growth and productiveness of plants and irrigate desert areas to make them fertile.

Singh, defines irrigation as the natural or artificial application of water to soil for purpose of supplying moisture essential or beneficial to plant growth (Singh, 1975, cited by Dahal 1991). Similarly, according to Garg, irrigation as the science of artificial application of water to land in accordance with the crop requirements of the crops (Garg,1981, cited by Pangeni 1982). According to this definition, the nourishment throughout the crop period for full-fledged nourishment of the plants in a cultivated land can be successfully done when irrigation facility is made available to the plants of cultivated land. In the words of Baidya, The application of water to soil assists in the production of the crops, wherever practiced; it is supplementary to the natural rainfall.

Water is an essential for growth of plants and it is the life blood for either food grain giving plants or a large tree of the nature. Supply of water plays an important role in the food grain production. Food cannot be produced without land and fresh water, increased output depends on more intensive and effective use of the land and water. In this respect water can be made

available to the farmland through different ways- natural and artificial. Water is normally supplies to the plants by nature through the agency of rainfall and artificial supply of water through canal, borehole and pumping set.

The sources of all water used for irrigation is, undoubtedly ’precipitation” that is the water received on the earth from the atmosphere in the form of rain , snow, hail, dew, etc. When the process of utilization of this water involves the construction of engineering works of appreciable magnitude, it would be called artificial irrigation (Singh, op.cit. foot note 50P-1)

In the above consideration it can be sum up that supply of water to the cultivated land through the use of any artificial devices is called irrigation. Therefore, irrigation is mainly a device to supply the necessary amount of water required to the plants of cultivated land.

Nepal is an agricultural country. According to the Ministry of agriculture and cooperatives people engaged in agriculture in 2001 is 65.6 percent. Thirty one percent of population is below poverty line among which 44 percent of rural population is below poverty line . Agriculture productivity is low just two metric ton / hector. Though , Nepal is an agriculture country the condition of agriculture is traditional because of limited irrigation facilities, Lack of improved seeds and technology.

Water is the life blood for either food grain giving plants or a large tree of the nature. Supply of water plays an important role in the food grain production. Food cannot be produced without land and fresh water: increased output depends on more intensive and effective use of the land and water. In this respect water can be made available to the farmland through different ways artificial and natural. Water is normally supplied to the plants by nature through the agency of rainfall and artificial supply of water through canal, borehole, pumping set, tube well etc.

Nepal has a short monsoon starting from the middle of June and lasts up to the mid September; the rest of the months are almost dry. Rainfall is irregular and unevenly distributed in various parts of the country. Irrigation is, therefore necessary to ensure the steady of supply of water to the farmland. The Hilly and Terrain areas where agriculture is mainly dependent on the monsoon rain, irrigation can enhance the productivity of various crops. One of the crops which require regular supply of water is the paddy. The normal

rainfall is hardly sufficient for paddy which constitutes the principal crop of Nepal. Such as winter crops like Sugarcane and Wheat cannot harvest good yields without irrigation.

There is close relationship between irrigation and income distribution of rural people. Growing of vegetables near towns or supplying of vegetables to these areas is made possible and profitable only when good irrigation facility is available. In the above context , present study attempts to analyses the socio economic impact of irrigation project for the socio economic development of the country like Nepal.

1.2 Statement of the problem

Most of the developing countries of the world, has been facing the shortage of agricultural production to meet the growing demand of food for its growing population. In Nepal a majority of people resides in village and they are involved in agricultural occupation for their livelihood. According to agricultural sample census 2001/02 it is estimated that 60% of the total population engaged in agricultural activities. Whereas the agro- production and productivity is not showing satisfactory trend. This is only subsistence level and not in sustainable way.

Up to 1965, Nepal use to export food grains to the neighboring countries, but now the actual growth in food grain has fallen below the growth rate of population. The cause of low productivity is on the one hand, food production almost entirely depends on the weather, and levels of output are determined by the frequency of the land to the large extent, and of the monsoonal rainfall. On the other hand, Nepal having a mountainous topography has limited cultivated land and the distribution of land among people is unequal. In Nepal only 20 percent of total area is under cultivation. (CBS , 2001).

In Nepal Agriculture sector has contributing 38% in GDP and it has 13% contribution on foreign trade. Among the 30, 91,000 hector cultivated land only 12,27,000 hector of land has irrigation facility (NPC, 2010). Agriculture is the principal sector of economy in which the economy of Nation depends. The 2.1 % of food production growth rate is insufficient for the growing population. Irrigation has greater prospects for the rural people prosperity and the food gap. The socio economic condition of the

country/community can only be uplifted by the agriculture development. Irrigation plays a significant or vital role in agriculture development as well as development of livelihood of an agrarian based society.

There has been a long history of canal irrigation system in Nepal. In the past " Raj Kulos" were famous Lichhibian Kings Anshuvarma and Jishnu Gupta had made a number of Raj Kulos in their terrirories. Several other " Raj Kulos" were constructed during the Malla regime for the cultivation of paddy and wheat.

" Increase in irrigation facilities could be very helpful in enriching agricultural production besides: availability of sufficient water through irrigation would make farmers able to double their production " (Bhandari, 1996).

Keeping in view the important role played by irrigation in the agricultural sector, Government of Nepal has also laid down a top priority to enhance irrigation facilities over all plan period. Irrigation development during different plan period is given in following table:

Table No: 1
Irrigation Development in Nepal

S.No	Plan period	Area in Hectares
1.	Before plan (1956/57)	6228
2.	Achievement during 1st plan (1956-1961)	5200
3.	Achievement during 2nd plan(1962-1965)	1035
4.	Achievement during 3rd plan(1965-70)	52860
5.	Achievement during 4th plan(1974-75)	37733
6.	Achievement during 5th plan(1975-80)	95425
7.	Achievement during 6th plan(1980-85)	172645
8.	Achievement during 7th plan	179337
9.	Achievement during 8th plan	206401
10.	Achievement during 9th plan	146703
11.	Achievement during 10th plan	87485
12.	Achievement during three year interim plan(2064/65-2066/2067)	58856
Total		**12,27,000**

(Source: National Planning Commission , 2010)

The above table shows that the irrigation had been developed highly in the period of 6th to 10th plans. The department of irrigation which is responsible for planning, designing and construction of new irrigation schemes is the major institutions responsible for irrigation development. The official mandate of this department that comes under the Ministry of irrigation covers all the aspects of irrigation from policy to implementation.
The DOI's main functions are:-

(i)The planning, designing and implementation of major, medium and minor irrigation System.
(ii) The sustained operation and maintenance of completed systems.
The irrigation areas developed under DOI or agency managed irrigation system that receives effective irrigation service in the spring and the monsoon season are well below that declared Net Command Area. For all schemes on average, Only 57% of NCA of the larger schemes is effectively irrigated in the monsoon season, where as a figure close to 100% would be expected from well constructed and well managed projects. In dry season schemes irrigate only average of 36%of total NCA."
"The major potential that remains for future irrigation development in Nepal lies with the large rivers. These rivers in the Terai have the potentially to increase agriculture production traumatically according to the recent estimates the implementation of all projects would increase the Net Command Area on the irrigation by over 3,30,300 hectares". The harnessing of the rivers would develop the remaining portion of irrigable land resource and make substantive contribution to Nepalese economy in terms of increase agricultural yields. Though , the country has faced bitter experiences in irrigation development because of certain economic bottle neck (Finance, Technology etc) and political embarrassments, still there remains immense prospects for further irrigation development in Nepal even they are mainly limited to Terai (Bhandari,1996).

With the above mentioned characteristics of the country. Government of Nepal also has identified irrigation as priority development program to decrease food deficit in the hills and Himalayas with strong emphasis on the improvement of existing projects and with preference given to reconstruction and rehabilitation of small and medium schemes, particularly those that promise substantial returns in the short time .To achieve this target government of Nepal had to implement great number of project over the country with the help of foreign aid.

The Government and Nongovernmental sector including planners, policy makers, economists, agriculturists; scientists ,sociologists and anthropologists working in the field yet have not done systematic and enough research towards the impact of Irrigation project. As irrigation system have social and economic impact on rural life. It can support in the various sector, so that it is essential to study in such topic . So this study on socio economic impact of Hemja Irrigation Project (HIP) is highly important, such research is necessary

to evaluate an irrigation project, which would suggest for further improvement and its successful operation which would have an impact over human life.

In this context , present study concentrates to answer the following research questions.

1. What types of socio-economic changes are appeared with the implementation of HIP?
2. Who are the people to be benefited by the HIP ?
3. what are the problems faced by the farmers under this irrigation project?

1.3 Objectives of the study

The general objective of the study is to find out socio- economic impact of irrigation programe provided by the Hemja Irrigation Project on the agriculture of project area (Hemja VDC). However, the specific objectives of the study are:

- To uncover social impact of the Hemja Irrigation Project to the farmers in the study area.
- To analyze economic impact of Hemja Irrigation project to the local people.
- To highlight physical condition of the project & problems related to irrigation project

1.4 Significance of the study

Agriculture production in Nepal has not been increased to the desired level. Its growth rate is not satisfactory to feed the growing population. In the lacks of improved irrigation system only the adoption of new technology, modern inputs and high yielding varieties cannot help to get the basic needs of production. Realizing this fact many irrigation projects has been undertaken by the government with the help of several Local and foreign agencies or INGOs. The project are expected to increase the production of agriculture sector which also help to raise the living standard and increase GDP of the country. HIP is also one of the projects in Hemja VDC, KASKI, which has

contributed to improve the condition of farming system of farmers in that semi urban area.
This study intended to analyze –

a. Impact of irrigation on agriculture
b. Socio economic and cultural change on farmers
c. Identify the problems related to irrigation system
d. Provide useful information to the government sector, policy makers, users group, management committee, irrigation projects,
e. Provide essential pre information for future plans and program as well as solving the problems in order to improve the project performance.
f. Helps to further researchers.

1.5 Organization of the study

The dissertation is organized into seven chapters, which includes essentials headings and sub headings. Chapter I deals with the general introduction including background of the irrigation , statement of the problem, objectives of the study, significance of the study, organization of the study. Literature review is included in the chapter II. Chapter III deals with the Methods adopted in the research, which included research design ,nature and sources of data, data collection techniques and methods of analysis . Chapter IV is about Hemja Irrigation Project. Similarly, Study area and the people included in chapter V. and the thematic title of this study is in the Chapter VI. At last in Chapter VII, findings of the study are presented, conclusion is drawn and some recommendations are given.

CHAPTER II

REVIEW OF THE LITERATURE

In the field of irrigation farming, most of the research work have been done in India, China, America and otjher Asian and European countries. But few research work have been carried out in the Nepalese context like Bhairawa-Lumbini Ground water irrigation project, Manushmar irrigation project , Bagmati irrigation project , Narayani irrigation project, Sunsari – Morang irrigation project. Research reports related to the impact of irrigation projects have been reviewed in this chapter. This included literature related to the general history of the irrigation, research activities in irrigation , irrigation development in Nepal and impact of the irrigation system or project.

2.1 Brief history of Irrigation

Agriculture is oldest occupation in the world. The historical background of this occupation may be traced back as old as the human civilization itself (Uprety: 1980) . Probably, irrigation started when the pre- historic man planted crops in low area. In the above context the history of irrigation is as old as that of agriculture.

Mediterranean agriculture has a long tradition. After four millennia of proto-agricultural experimentation, agriculture emerged in the Eastern Mediterranean Basin 7500 years ago. (Butzer et al, 1985) . Prehistoric evidences and archaeological findings indicate that early civilization developed along rivers that supplied irrigation water to the fields.

Egyptian used water from the Nile river to irrigate adjacent fields as early as 5000 B.C. Historical records show that king (who lived around 3100BC) had a large masonry dam built to control the Nile- river and provided water for irrigation.

The ancient Babylonians developed a flourishing civilization based on irrigation agriculture . Babylonian records revealed that irrigation works existed before the time of King Hammurabi about 2200 BC (Encyclopedia Britanica, 1943-1973) .

The practice of irrigation spread to china from Babylonian. The Chinese are known to have had irrigation before 2200BC. The famous Chinese irrigation work TU – king Dam was build about 200 BC., Which provided water for about 200000 ha. Of land (Benton William: Encyclopedia Britanica). The agricultural region was developed in the Gangetic valley during the first millennium B.C. The Chinese Pilgrim Sung Yun has mentioned that the people of :pamir region used the water of the rivers for irrigation (Benton:1943-1973).

2.2 International context

Jha (1967) evaluated the benefits of Trebeni Canal in India. He compared the productivity of irrigated land with that of non -irrigated land. He concluded that one of the important effects of irrigfation was different type of crops pattern in the irrigated area to a great extent, grew more paddy and less sugarcane. It appears that irrigation has facilitated to from sugarcane to paddy cultivation.

Hazlewood and Linving Stone(1982) have studied the impact of irrigation in Tanzania. According to them, the small farmers are economically more efficient than the large farmers. Small scale irrigated farming, too all its advantages in economizing in source management in using cheap family labor and distributing widely the benefits of irrigation, can be badly deficient in these technical virtues.

The Ministry of Agriculture (1982) reported that the spraying method of irrigation in Britain started since the Second World War. And in 1976 about 6000 agriculture holdings were equipped for irrigation, It has also added that in drier parts of the country the role irrigation has greater importance. In Britain, same agricultural crop, depend to rainfall and it rises crop yield.

Pandey (1978) has studied the impact of irrigation on rural development in India. He states that small size land holding family is higher in the irrigated areas. In the irrigated land, a different variety of crops are being cultivated and employment, literacy, income are higher compared to the non irrigated areas. For examples, there were 71.44 illiterates in the non irrigated land.

James (1982) has studied the irrigation management China. He has summarized that water is provided to monoculture at any given time of the year because water must be in rotation only in the monsoon period, but the irrigation must be rotated between day and night and there must be unity in water uses. They usually plant and grow at least two times agricultural crops over the course of a year.

2.3 Nepali context: Irrigation development in Nepal

Attempts for increasing irrigation facilities in Nepal date back to quite a long time. In the past, Raj Kulo (indigenous traditional system) were famous around the capital city and were operated by government subsidy to irrigate the land. King Shivdev had built a dam at Balkhu Khola near Kirtipur for irrigation. Anshuvarma and Jisnugupta had made a number of Raj Kulos. Several other Raj Kulos were constructed during Malla regime.(Curriculum Development Center, 2041BS).

Mallick (1981) according to him rice was cultivated in Nepal earlier than the Vedic period which indicates that Nepal has a long history of agricultural and irrigational practices. Likewise, Master Plan of Irrigation Development in Nepal, Development of Irrigation (1990) after the restoration of National intertation of Nepal, its rulers and statement had devoted their time, energy and national resources only to wards and internal crises more than to reforms and development activities. However,no remarkable works were done towards irrigation up to Rana Prime Minister Chandra Shamsher. Until these days, small scale relatively short length and run-of -river were the main irrigation systems. International agreement concerning irrigation development in Nepal took place first in 1920, during the Regime of Rana Prime Minister Chandra Shamsher.

Before implementation of the periodic development plan in 1956 only three canals Chandra canal in 1926, Jagadish Canal in 1942 and Juddha Canal in 1946 were constructed in Saptari, Kapilbastu and Rautahat district respectively (DOI 2053). After the implementation of the Periodic development plan in 1956, several irrigation Project were undertaken in different parts of Nepal. Until end of 10^{th} plan 11,94,628 ha. of agricultural land was provided with irrigation facilities but area under irrigated land was only 6228 ha. Before 1956 (Three year interium plan 2064-2067,NPC). The existing irrigational facilities in Nepal are extremely inadequate. As we have 26,41,000 ha. of land is appropriate for agricultural activity among that 17,66,000 ha. Irrigable land is in Nepal. (NPC,-2067).

In Nepal , surface irrigation is the main system used in various parts of the country. And , of course traditional methods of irrigations like Pynes, terrace, well and canal irrigation came also in practice. Various types of hill irrigation projects have been completed in the western development region of Nepal. Hemja irrigation project is one of the successful project in this region.

2.4 Impact of Irrigation Project and system

Impact is the outcome of the project effect. It is an expression of the results actually produced, usually of the level of broader, long range objectives. Impact may also be defined as the ultimate change in the living conditions of beneficiaries resulting from a project or programme, include change in actual living standard flowing from the project; as increased income, improved nutritional status also increased employment, income education and nutritional level.

Various institutions like Agricultural Project Service Center (APROSC), research scholars, economists, geographers and sociologists have undertaken several research works concerning the impact of the irrigation in Nepal which stated various facts , findings ,impacts and valuable literature in the field, which shows that due to the irrigation facilities crop production, cropping pattern and socio-ecomonic activities have increased, it increased employment and income in its command area so that the living standard of local people is raised. But there was also negative impact of irrigation.

In the study on “Evaluation of the study of participatory small scale irrigation project " APROSC (1980) reported that small scale irrigation project is important in our country because of topography, economy and technical knowledge, small scale irrigation project, however cost is low but public participation is high, 6here is high production of crops. In the small scale irrigation project where irrigation facilities have been regular there confines the diversified pattern of cropping. The repair notes that there is a positive correlation between local participation and improved agriculture in the project area.

Similarly, the report of Sumsari_ Morang Irrigation Project of APROSC (1987) has summarized that the proportion of cultimated area under late paddy and the c ultivated land under multiple cropping I the command area have increased. Further, the use of chemical fertilizer have crop production have also increased. Small farmers are observed to have higher average yield in most of the crops. After the irrigation project cropping intensity increased but labour use intensity has not increased at the same rate. Finally, the study also notes that the gross income from crop production has increased by 80 percent that that of base line study.

Uprety (1989) has also made a study on the topic of “The Impact of Kankai Irrigation Project on Paddy Production . He has summarized that the rate of paddy production has increased with the increase of irrigation facilities and that irrigation brings the higher intensity in the cropping pattern. He also summarized that there is positive relationship between irrigation and paddy production. Thus we can says that there may be a positive relationship between irrigation and production of different crops.

The effect of irrigation projects on farming in different sizes and qualities of land will also differ. Pyakuyral (1987) notes that land holding is still concentrated in a few hands and larger farmers have been more able to take advantage of irrigation facilities than have small farmers.

Parajuli on his study “Impact of Pokhara Irrigation Project in Kaski District. “ writes that market price of vegetables has been relatively cheaper after PWCIP than before. Owing to the increased irrigation facilities with the operation of PWCIP, people’s standard of living has slightly been raised . It is also concluded that irrigation facilities increase cultivated land. It means

that irrigation brings change in cultivated area as well as agricultural production (Parajuli: 1991,p.72-74). Because of irrigation facilities, crop production yield, cropping pattern, irrigated areas and socio-economic activities have increased.

The effect of irrigation projects on farming in different sizes and qualities of land will also differ. (Pyakural (1987) notes that land holding is still concentrated in a few hands and larger farmers have been more able to take advantage of irrigation facilities than have small farmers.

According to Pangeni (1987) " Due to the irrigation facilities crop production, cropping pattern and socio0economic activities have increased. But there was also negative impact of irrigation that the period and pumping scheme lifted sand with water during the irrigation period and pumping tools had been adversely affected by sandy water " . Due to this Sandy soil pumping scheme may not be durable for long time to supply water studies on Nepalese case have confirmed the general hypothesis that irrigation is expected to have a positive effect on productivity, cropping intensity and input use. Agriculture Credit Review Survey (1980) shows that rop yield, cropping intensity and input use on irrigated farms are consistently higher than that of the un-irrigated ones.

Based on the above mentioned information present study highlights socio-ecomonic impacts of an irrigation programme practiced in rural Nepal.

CHAPTER III

RESEARCH METHODS

3.1 Research design

As mentioned above, the overall objective of this study is to find out social and economic impacts of irrigation facility provided by HIP on the agriculture of the project area. Hence, it is of utmost important that various conditions prevailing in the respective households selected for the study before the construction of HIP will also be known to compare them with the conditions after the construction of HIP . Therefore the research design was explorative and descriptive in design, which includes both qualitative & quantitative techniques. Data such as socio-economic figures are under descriptive research design and impact related informations are under exploratory research design. Such a research design helps to fulfill the above mentioned targets.

3.2 Rational of selection of the study area

Hemja Irrigation Project has been selected for the study which lies in Hemja VDC of Kaski district. Which is about 10 km northwest of Pokhara at an elevation of 1067 m. HIP is introduced in this VDC in 1982 and completed in 1987, made the positive impact on the people of this VDC. Now it is run by the WUA effectively. Although, there are some problems on this VDC related to HIP . Hemja VDC is my home place and being a student, I have chosen this place for my study purpose for cost effectiveness, to collect real information about own place, and explore the positive and negative facts about the impact of HIP and to find out the problems related to the HIP .

3.3 Nature and source of data

Both qualitative and quantitative nature of data has been implemented in this sutdy. This study is primarily based on primary data, however the secondary data are used to get detail information to make qualitative research. Primary data are obtained from observation and field work of commanding area and secondary data are collected from the Government of Nepal and its institution, local functionaries, library studies, journals, bulletins and previous studies etc.

3.4. The universe and sample

The study was conducted at Hemja VDC. There are 9 wards in this VDC, from which 5 wards ward no.1,2,3,4& 9 which covers the command area of irrigation project were selected. Total number of households in these wards was 1088 out of this total number of beneficiary household was 803 in the command area. Therefore a sample size of 10 percent of the total number of beneficiary households (N=803), was drawn , the sample size is 80 (n=80). Therefore the universe of the study is 803 and sample is 80. On the basis of above mentioned techniques 80 households were selected from 5 wards and households were selected on the basis of lottery methods of sample .

Table No. 2

Beneficiary households & Sample size by Wards

Ward No.	**Total Number of Household**	**Sample size**
1	148	15
2	160	16
3	119	12
4	165	16
9	212	21
Total	**803**	**80**

Source: WUA records of HIP from VDC office.2010

3.5 Data collection techniques

In order to obtain adequate data for proposed research, the following tools were used for data collection:

3.5.1 Interview:

In order to collect information about the cropping pattern, cropping intensity, socio-economic condition of the people, occupational status, physical condition of the canal water user activities and to know about the impact

before and after the project all relevant and structured questions were developed for interview. This is for selected households. In this study, Two types sets of questions were developed. Firstly, for farmers and secondly, for the management committee and HIP officials (See annex-I & II).To find out the situation of before Irrigation project senior and key informants were focused.

3.5.2 Observation:

The physical system and agronomic condition was directly observe during the field trip. Observation was made on the physical condition of canal, distribution system of water, cultivation pattern, water conflict resolution, Water User Committee meeting was also observe within the entire field trip.

3.5.3. Key Informants Interview:

Five peoples were selected as key informants including VDC, chainperson of water user association, local agriculture teacher, and local intellectuals. Key informants interview also adopted in this process . They were interviewed with the help of the key informants interview schedule.

3.6 Data processing and Analysis

Both primary and secondary data gathered from various means were analyzed by using the descriptive and statistical method of analysis. The quantitative data on population, education, land holding size, land tenure system, crop yield irrigation facility etc. was processed, classified and tabulated. These data were analyzed by using percentage. The rest of the data on irrigation system activities regarding organizational management activities, Physical system activities, cropping, land value etc. are more qualitative in nature. Hence, they were logically described. processed and tabulated.

3.7. Ethical Consideration

In this study , some ethical norms and values were used, which guided for less biasness during study period. Such as:

Respondent's personal /private relation and confidential matters, which affects in his/her life were not mentioned in the study.

Respondents or key informants were explained the purpose and objectives of the study clearly and understandable way. This study did not consider to add of researcher's own expectation and false information.

No unnecessary pressure was made to the user refusing to involve in the discussion but more efforts made to motivate such users to involve in the discussion.

Data/information were not exploited or manipulated during study period . Data and information wer interpreted on the basis of the gathered information and findings.

The due respect was given to the respondents culture, social values and their ideology.

3.8 Limitation of the study

This study has few limitations. Firstly, it is limited to the area of Hemja Irrigation Project in Hemja VDC of Kaski district is 10 km northwest from pokhara valley. Secondly, in case of the absence of sample households head , other member of that family was interviewed.

This study is aimed to have an understanding of the impact of HIP in Hemja VDC . As a student, the researchers has handicapped by the financial resources as well as time factor to design the study in widen perspectives. It was included only some of the selected socio-economic variables and is only limited to Hemja VDC . So that the result may not be representative to other areas of such programme. The study areas lies under the supervision of local user groups.

CHAPTER IV

STUDY AREA AND THE PEOPLE

4.1 Geographical setting of Hemja VDC

Since the advent of the " Partyless Panchayat" political system set up in Nepal in 1961A.D., the country was divided into four development regions(DR) and further divided into five development regions, 14 zones and 75 districts . Kaski is one of the 75 districts, situated in the hilly part of the western development region of the country, which is bounded in the south by Syangja and Tanahun districts, in the east by Lamjung district and Parbat and Manang districts in the west and north respectively. Geographically, the district can be divided into four sub- divisions on the basis of its nature, lanscpe and altitude. The district head quarter of kaski is pokhara which is one of the famous tourist destination of the Nepal.

Hemja VDC is one of the VDC's of Kaski district. It is situated 8km north-west of Pokhara at an elevation of 1067 m above the sea level in kaski district. It is located at the middle part of Kaski. The total area of this VDC is 10sq km. This VDC is a Byansi and tar region of the Kaski district.

Hemja VDC is bordered in the south- west by (Yamdi kohla with) Kaskikot and Sarangkot VDC, in the north-east by (Seti river with) Puranchaur and Lamachaur VDC, and in the north west by the Lahachowk and Dhital VDC respectively. The border of Hemja VDC is demarcated in the north by Mardi khola by Seti river in the east and by Yamdi khola from the west to the south.

The shape of the VDC is like a obtuse angle triangle, which is expanded from the eastern to the north – western and in the western part of the VDC is narrow. This VDC has been surrounded by the hill ranges of varying heights, Sarangkot-Kaskikot in the south – west, Dhmpus in the west and Batase danda in the north.(VDC profile,2010)

In this VDC wide climatic variation is not found in terms of its temperature and vegetation type.Climate is an integration of weather conditions for a given period of time within a given area whereas, whether is the sum of total atmospheric conditions at a given place at a given time Generally , the climatic conditions of this VDC is sub tropical as found in the plain region , byansis are comparatively hot and warmer.

Geographically, this VDC can be divided in to three sub- divisions on the basis of its altitude and landscape. They are a) Hill region b) Plain region and c. River bank region.The hill region is situated in the north west part of the VDC, which is covered by the natural forest: these forest are used by the people for the purpose of fuel, furniture and fodder for domestic animal. The plain region is situated in the western and south-eastern part of the VDC. Plain land of western part is more is more fertile and productive pockets of the crops and this also used for the residence. Major crops of this area are paddy in the summer season and wheat, oil-seed and potato in the winter season. Yamdi Khola (Suikhet khola), Khhahare khola and Chaurasi kulo are the main sources of irrigation for the plian land of western part. Hamja Irrigation Project (Annapurna canal) provides water in the plain land of south eastern part only.The total alnd of this VDC is 31984 ropani in which 10042 ropani is khet land 5689 ropani is pakho land 12535 ropani is minaha land and rest of the land is in the process of registration.(VDC profile,2010).

4.2. Natural Resource

Various natural rivers stream, khola, landscape and panoramic scenes of Himalayan increase its natural beauty, due to which Hemja VDC is growing in the processof urbanization. The seti river and Yamdi khole have made the VDC more-eastern and west-southern sides respectively. Water, fertile soil , slit, stone and forest are the major natural resources of this VDC. In this VDC there have not been any research or excavation of the natural recources from the government and non-governmental level.

a. Soil Type

Soil is the most important thing for natural vegetation and agriculture activities . The plain land (Valleys) and byansi on the bank of Yamdi Kholea are more fertils with alluvial soil.Likewise, Biruwaphant , Gairy khet, Deuraki khet, Asi khet and challis khet are more fertile land . The soin types here are slit loam , sandy loam , loamy sand etc.All the crops are widely cultivared in these valleys and plain land. These valleys are situated in the bank of the Yamdi Khola and around the Annapurna canal.

In the north eatern part of the Hemja VDC , soil is somewhat alluvial and coarse or gravel.Chuchi Gairy, Timure, Bhairam , Lankure, Ghaikhyor , Satbise Lamopatan , Mareghat, Babiya Tara and Tulsi Tara are suitable for crop production with irrigation facilities by the HIP. The typed of soil found here are loam, slit loam and coarse. Rice, maize , wheat , oil seed, potatoes and vegetables are cultivated in these valleys by season. The bank of Seti river is suitable for rocky and sandy soil with stone which is being used for the construction of buildings reads and canals.

b. Water Resource

Several streams like Mulpani, Dandeldurekhola, jasikuna, Yamdi khola , seti river etc.are the major water resources of this VDC. There is no lake and natural pond but small an large human made ponds exist in this VDC. They are GAairy patan pokhari and Melbot pokhari in ward No. 3 which are being used for feeding water to the domestic animal and washing clothes.

The stream, Mulpani, Dandure khola and Jaiisikuna provide drinking water in this VDC through the connection pipe line . Seti river and Yamdi Khola are the permanent source of water in this VDC. The water of Seti river is not being using yet but the Yandi khola is most useful for providing irrigation facilities in this VDC through the Annapurna canal (HIP). The total targrt of irrigation area of HIP is 320 ha, land but net irrigated area is 235ha. Serving about 684 households as pointed out by WUA members and irrigation office.

c. Agricultural and Vegetation

Low lying valley and warm and moist climate support to the growth of tropical and sub tropical plants and crops. Tropical moist deciduous and thatched (Khar in native)grass are natural forest. Approximately, 12 percent of the total land to the south – west and north –west of this VDC is occupied by the forest. But nowadays, the population increasement has given rise to deforestation in this area. In the south – west and north-west part of the Hemja VDC, the forest type is a combination of hardwood type of mixed broad leaved types. This type of forest is extended around the Batase CHautara, Bhairab Swanra, Khaldo,Bhitto and FIbrikot in which Chilaune (Schima walich); Sisou (Dalbergia sisoo); Simal (Bombox ceiba); Katus (castanopsis indica), Kafal (Myricaeculenta): Uttish (Unius nepalensis): Bar (Ficus bangalensis): Pipal (Ficuse religiosa); Mauwa (Bassia lertifolia) Khar Kans (Saccharum spontaneum):P Bamboo etc are being used for construction of furniture, fodder for domestic animal and as a fuel. Somewhere the Lali Gurans (Rhododendronarboreum): Nigalo (Arundinaria intermedia) ; Sallo (Pinus indica) and also another types of vegetation are found in forest. In or around the residential area and bari, the trees are the combination of dale ghans (for fodder) for livestock and fruits. The main types of dale ghans are Pakhuri, Kahuro, Badahar, Kutmiro, Gindari, Chuletro etc. The main types of fruits found here oranges, bananas, guavas, lemons, lychees, mangoes etc.

People grow different types of summer and winter crops in this VDC. Paddy, wheat, Maize and Millet are the major food grains and vegetables and orsnges are the main cash crops in this area. Most of the people grow potatoes and upseason vegetables in large scale in green house. Besides mustard, buck wheat, Uwa, barley and in vegetables mainly Cauliflowers, cabbages, brinjals, tomato, bitterguards. cucumbers, radishes, carrots are also vegetables which grows in large scale. Animal husbandary is also prevailing for the purpose of agricultural manure and economy. Cattle like buffaloes, goats, cow and ox and poultry constitute the major livestocks

4.3 Population size and distribution

Total population size of the Hemja VDC is 8702 with 1902 households and 2378 families. The population is composed of 4099 males and 4603 females.

Total population size of command area of HIP is 5136 with 934 households and 1113 families. The population is composed of 2504 males and 2632 females. In which, 684 households are the directly benefitted group and 250 household are the indirectly benefitted group from the HIP. Among the indirectly benefitted households , 165 households are Tibetan refugees, 36 households have less than one (10)Ropani of land, 34 house holds are landless but households are resided within the command are and their cultivated lands have situated outside of the command area.

Table NO.3

Ward –wise population distribution by Sex.

Ward No.	**Households**	**Families**	**Population**		
			Male	**Female**	**Total**
1+	308	385	640	724	1364
2+	198	248	407	463	870
3+	128	160	257	330	586
4+	195	244	420	516	936
5	114	143	240	259	643
6	323	404	769	825	1054
7	136	170	317	326	643
8	241	300	510	542	1052
9+	259	324	539	618	586
Total+	1088	1360	2263	2651	4914
Total	**1902**	**2378**	**4099**	**4603**	**8702**

Source: VDC office. 2011

+ Command area

On the basis of above table w ard no. 1 is highly populated area and ward no 6 is lowest population which have 1364 and 643 no respectively. The number of female is more than male .On the basis of household ward no. 1 is highest and ward no 5 seems lowest in number.

4.4 Caste /Ethnic group

The Brahmins are ethnically the major group of this VDC. Other ethnic groups of Hemja VDC are Chetri ,Newari and occupational castes like Sarki, Damai, Kami and Gaine. The chhetries are in majority after the Brahmmins and then comes the occupational cases. Tibetan refugees also resided in ward no.1 of this VDC with 183 households .The major ethnic composition of this VDC is illustrated by the following Table No. 3 by their percent of total population

Table No.4

Ethnic/ caste group affiliation in percentage

S.No.	Ethnic/Caste groups	population	Percent
1	Brahman	3518	40.43
2	Chhetri	2433	27.95
3	Thakali,Tamang,Magar	633	7.27
4	Newar	474	5.44
5	Kami	389	4.47
6	Sarki	368	4.22
7	Gurung	289	3.32
8	Damai/Dholi	150	1.72
9	Gharti/Bhujel	117	1.34
10	Muslim	60	0.68
11	Gaine	54	0.62
12	Sanyasi	51	0.58
13	Others	166	1.90

Source: CBS, 2001

Brief introduction of each ethnic/caste group is illustrated as below.

The Brahmin:

The Brahmin- the Parbate Hindus, thread wearing caste group, have occupied majority of the population in this VDC. The Brahmin settlement in this VDC is called Upallo Hemja and it is divided in ward No. 4, 5, 6 ,7 and 8 with considerable number of the Brahmin households. They are also scattered in other wards of the VDC. Their occupations are mainly agriculture, priest-hood, the government and non-government services, trading and foreign employment.

The Chhetris:

The Chhetries are also the Parbate Hindus, thread wearing caste groups who have occupied the second majority in this VDC. The settlement of Chhetries is mainly centered in Kunwar of Ward No. 9, Thapa thar of ward no. 2 and Karki thar of Ward No.3. Moreover they are also scattered in other wards of the Hemja VDC. Karki, Thapa, Kunwar ,Khatri are the Hindu caste groups who prefer to say themselves Chhetris. Their main occupation is agriculture. Joining the Nepal army and Indian army and also working in the Government and non-Government offices are the other main jobs.

The Newars:

The Newars are the groups of Tibeto-Burman speakers, who are in fourth majority in this VDC. Their settlemenet is mainly scattered in ward No. 2,3,4,5 and 7 of the VDC.

They use their mother tongue (Newari) only in their own community and family but they mainly use Nepali language. Their major occupation is trading. The others are agriculture and somehow the involvement in services.

The occupational Castes:

There are many occupational castes in this village. The occupational castes are as Kami, Damai/Dholi, Sarki, Gaine and other Tibeto-Burman speakers (Tibetan refugee) who have occupied considerable portion of the total population of this VDC. Their settlements are scattered all over the major settlements of the VDC except the Tibetan refugees. The fact is that the occupational castes settlements are essentially associated with the other socalled high castes- Brahmins , Chhetris and Newars.

4.5 Literacy and Education

Educationally the Hemja VDC is quite satisfactory. There are all total 13 Educational Institutions in which one campus, one plus two, three high school, one lower secondary achool, seven primary schools are contributing for the village.The total student currently studying in those instituions are 3366 in which 1655 are boys and 1711 are girl. The total number of students are 162 . total student teacher ratio is 1:20.78.

Literacy of people in this VDC is illustrated by the following Table.

Table No. 5

Literacy rate by Sex

	Male	**Female**	**Both sex**
Illiteracy percent	7.65	20.23	13.94
Literacy percent	92.35	79.77	86.06
Total	**100.00**	**100.00**	**100.00**

Source: VDC Profile, 2003.

4.6 Population composition:

The study area population has settled a conglomeration of different ethnic caste group as Brahmin, Newar, Chhetri, Gurung, Kami, Sarki, Damai, Tibetan & others. In which, Tibetan refugees have settled in ward no.1 which is called Bhote camp in native and other ethnic/ caste groups have scattered settlement in the command area. The study area composed by the 1088 households. Out of them 803 Households are the directly beneficiary groups of HIP as pointed by the WUA profile, so the 80 households were taken as a sample size as shown in Table No. 1 .

The total population of the sample household is 491 which is composed of 237 males and 254 females (See table no 6) . In other words, in terms of sex, the population structure is composed of 48.14 percent males and 51.86 percent females.

Table No. 6

Respondents classified according to Age group and by Sex.

Age group (in Yrs)	**Male**	**Female**	**Total**	**% of Total**
Up to 15	77	73	150	30.55
16-60	137	154	291	59.27
Above 60	23	27	50	10.18
All	**237**	**254**	**491**	**100.00**

Source: Field survey 2011.

Table 6 shows , age groups of up to 15 have 30.55 percent. The age group 16-60 have 59.27 percentage which is active population and the population above 60 is 10.18 percent it also shows that number of females is higher than the number of males.

In this study the researcher has tried to categorize the population of sample households in the three different age groups on the basis of their economic activities 0-15 years, 16-60 years and above 60 years, in which generally considered the age group of 0-15 and above 60 years are called dependent or economically inactive population and age group 16-60 years is called independent or economically active population . Similarly age and sex of the respondents is given in the following table.

Table No: 7

Distribution of economically dependent and independent population by Age/Sex.

Age group	Frequency			Male %	Female %	Total %
	Male	Female	Total			
Up to 15	77	73	150	51.33	48.67	30.55
16-60	137	154	291	47.o8	52.92	59.27
Above 60	23	27	50	46.00	54.00	10.18
Total	237	254	491	100	100	100

Table 7 shows a picture of the economically active and inactive working manpower of study area from sample households. Of the total population, the working population or independent population is estimated to be about 59 percent and the rest 41 percent is dependent population in which about 47 percent males and 53% females of the total population are economically active, it means that the higher percentage of female population is economically active than males. Thus the composition of the population shows that there is a large number of dependent people i.e. 31 percent below 16 years; the highest number of independent population belongs to the age group 16-60 i.e. 59 percent and the lowest number of dependent population i.e. 10 percent belongs to the age group above 60 years.

Although, the age group below 15 years and above 60 years fall under the economically inactive population group, but in the study area, most of the age groups above 60 years are involved in various types of household works as rearing and grazing of domestic animals, irrigating the crops, looking after the children, cooking etc. Most of the age group below 16 years also helps the above mentioned household works in the off time of school.

10 percent are old age i.e. above 60 years age group, which denote the higher life expectancy to compare with life expectancy of Nepal. The life expectancy of males is lower than the females in the research area.

Table no. 8

Respondents classified according to the level of education

Level of Education	**Frequency**	**Percentage**
Illiterate	63.	12.83
Lirerate	159	32.38
Schooling (I-V)	98.	19.59
Schooling (VI-X)	90.	18.32
SLC	49.	9.97
IA	24.	4.88
BA and above	8	1.62
Total	**491**	**100.00**

Source: Field survey, 2011

Table 8 shows the clear number of population according to their acquired level of education. According to it, approximately 13 percent are illiterate in which the researcher excluded the age groups of below schooling i.e. below 5 years while the only literate population is approximately 32 percent, Those who are schooling in primary level (I-V) have 20 percent, in secondary level(VI-X) is 18 percent; 10 percent have passed SLC levell education; 5 percent have passed IA or equivalent to IA Level and only 2 percent of people have acquired equivalent to B.A. level and above . So, the literacy rate is 88 percent of total population of sample households. Female literacy rate and acquired level of education is lower than the male. The male dominated society and the ritual customs are role played on this side.

4.7 Occupational status of the people

Large number of population of the Hemja VDC area is affiliated with agriculture. Almost the sample households population are more or less related

with agriculture either as a primary or secondary occupation due to the irrigation facilities provided

From HIP and also the sample size was taken from the direct beneficiary households of HIP . But due to the connection of high way (Pokhara Baglung high-way), high literacy rate and lower land holding size of the sample houses are trying slightly to diversify the occupational structure of dwellers of the command area. Economically active population is divided into 5 types of occupational groups in the study area on the basis of their primary occupation, such as agriculture, services within Nepal, service out of Nepal can be illustrated by the following table.

Table No. 9

Occupational status of Respondents

Main occupation	**No. of persons**	**Percentage**
Agriculture	272	64.00
Services in Nepal	45	10.58
Services in foreign countries	34	8.00
Trade and business	38	8.94
Others	36	8.47
Total	**425**	**100.00**

Source: Field Survey, 2011.

Table No. 9 shows that among the 425 sample population of ahe group 15-60 years, maximum number of population i.e. 64 percent which is engaged in agriculture. Service within and out of Nepal has covered the second highest number of population. And 8 percent population is involved in other activities which are house-wives, tailoring, labors etc. Among the remaining other economically independent population, some are schooling and some are unemployed. A remarkable number of retired population from service are involved in the agriculture and other activities of the households works.

4.8 Respondents birth place and cause of Immigration

Large number of respondents or household heads are the local born in this study area and a small number of household heads are immigrated from other adjacent VDCs. Birth place of the sample household respondents is indicated by the following table.

Table No.10

Birth place of the household head.

Birth place	Frequency	Percentage
Local born	75	93.68
Outside born	5	6.32
Total	80	100.00

Source: Field survey, 2011.

The above table indicates that 94 percentages of the total households heads were local born and only 6 percent immigrated from the adjacent VDCs of Hemja VDC. During the field survey We find that during the decade of 2020-2030 out-migrant rate was higher but nowadays there is a trend of in-migrant in the research area , the respondents gave a number of causes for migration from their birth place. One respondent gave the causes of that it was to have been landless due to landslide and soil erosion. Other two respondents gave the causes of migration that it was due to dowry land here which has the irrigation facilities. According to the above mentioned causes of migration suggests us that the land of study area is good for agriculture production and residential purpose.

Nowdays some people have immigrated there from other places of the country for the business purpose on the bank of the Pokhara-Baglung highway. The causes of such kind of immigration are the availability of transportation facility and tourism center. Milan Chowk and Phedi are the business centers of this VDC which does not belong to command area. In this

area the rate and process of buying and selling of land is increasing due to the business centers but in the study area it is mainly concentrated on the road side of the Pokhara-Baglung highway and near the Chok of the road. Thus the trend of immigration is greater in the business centers than in the study area .In other words, the trend of immigration is greater in the side of the highway than the other residential areas of the VDC. The rate of buying and selling of cultivated land is increasing after the introduction of HIP. The rate of irrigated land is higher than the non-irrigated land of the command area.

4.9 Size of land holding and level of income

The present land holding size is quit unfavorable in the country from the point of view of equal distribution of land. Approximately 70% of the households have less than 30% of cultivated land and 30% households have 70% land of the total land area of the country under the cultivation (CBS, 2002).

The number of small landholders is expected to be higher in the study area because of fragmentation of land and existing land holding system of the country. The size of land holding is smaller in the study area than the Terai because of being a hill area. The size of landholding of the study area can be illustrated by the following table.

Table No. 11

Distribution of Households according to the size of land holding

Size of holding (Ropani)	**Holdings HH.**		**Area of holdings**	
	Number	**Percent**	**Area (Ropani)**	**Percent**
Below 10	35	43.15	147	12.23
10-20	29	35.79	370	30.78
20-30	7	9.47	256	21.30
30-40	3	4.21	165	13.73
40 and above	6	7.37	264	21.96
Total	80	100.00	1202	100.00

Source:field survey, 2011

The table above indicates that 43% households have very marginal cultivated land i.e. below 10 ropanies, they are holding only 12% area of the total land holding of the sample households. Average holding of them is 4 ropanis. 7% households have more than 39 ropanis of land which are holding 22% of total land and average holding of them is 38 ropanis. Similarly 36% households hold 31% area of land, who have tend to 11 ropanis; 9% households have 21% area of land who have 20-30 ropanis and 4 percent of households own 30 to 40 ropanis and they hold 14% area of the total land in the study area. It shows that the 57% households have occupied 88% of the total holding area and rest of 43% households have own 12% area of total holding. Thus the average size of the land holding is 12.65 ropanis per households in the study area.

In our agrarian society , the land property determines the level of income among the farmers, likewise the level of income depends upon the land holding size of farmers in the context of rural agrarian society. Generally, the greater size of land holding people has the higher level of income. But in our society, the changing trend of family structure as from joint family to disintegrated or nuclear family promoted the gragmentation of land and increased the number of small land holders. The level of income is also decreasing in the agrarian society.

Table No. 34

Distribution of Households according to the level of income.

Level of income	**No. of households**	**percent**
Up to Rs 50,000	22	27.37
Rs.50,001-70,000	24	30.53
Rs.70,001-90,000	17	21.05
Rs.90,001- 1,10,000	12	14.74
Above 1,10,000	5	6.32
Total	80	100

Source: Field survey, 2011.

According to the above table 30.53 percent of households have annual income between Rs 50,000-70,000 followed by up to Rs. 50,000 (27.37 %) , Rs 70,000-90,000 (21.05%) Rs,90,000-1,10,000 (14.74%) and above Rs, 1,10,000 (6.00%).

The total land holding size of the sample households is increased in the last 10 years by only 1.29 percent of the total land before (1986) HIP . The farmers of the command area have been doing the process of buying and selling of land but land buying is more than land selling in the last ten years . Considering all these things we can say that the level of income is more or less increased after the implementation of HIP.

4.10 Health / security

There is one government health center, one Ayurvedic health center and few medical hall are in the village. They are responsible for the entire programme of the health sector including family planning, reduce the birth rate, enhance the life expectancy of the people, maternal health care health awareness and providing necessary treatment for the needy people. The Manipal medical college which is about 6 km far from Hemja is near by so many people visit the Monipal and Pokhara Regional and other private hospital as they need. There is no any ambulance service of the VDC and there is no any Hospital in Hemja. People express their deep concern for establishment a Hospital and ambulance service in Hemja.

There is not any security post or police office in hemja. The nearest security post is in Bagar Pokhara and other nearest security posts are in Dhampus and Naudanda. One security check post is needed in Hemja VDC.

4.11 Communication

Nowadays communication is a lifeblood for the socio-economic development of the country. CDMA and mobile phone service is available in Hemja, PSTN service programme is going to lunch soon. After completion of the PSTN land line service the communication infrastructure will be improved soon. There

are few cyber cafe in Milan chock. One post office with few staffs in contract basis is for postal service.

4.12 Government and Nongovernmental office

There are six government office in the VDC which are Hemja VDC office, Range post, Agriculture and Veteranary sub center, post office and health sub post . Non governmental office lies in the VDC are Kopila Nepal, Multipurpose social development institution, Aadarsa Manab Uddwar Sewa Samiti, Redcross society, Hemja Library etc.

CHAPTER V

INTRODUCTION TO HEMJA IRRIGATION PROJECT (HIP)

5.1 Introduction

The Hemja Irrigation project is located in Hemja VDC of Kaski district, which is at a distance of 8 km northwest of Pokhara at an elevation of 1067 meter above the sea level. This location is situated between 28.15° west latitude and 84.00° north longitude.

The command area of HIP is the ward No. 1, 2, 3, 4 and 9 of the Hemja VDC. This area is an important loamy and fertile cultivated land due to the provision of irrigation facilities by the HIP, where farmers grow various types of summer and winter crops at present. Before the implementation of HIP, most of the area was meadow , barren and pastureland, somewhere cultivated land was irrigated in the summer season only by the Chaurasi Nahar (indigenous canal), in which farmers grew maize, millet and low quality of local paddy 'Anga' and 'Jhauri' in native.

The HIP is under the programme of the first Hill Irrigation Project funded by Asian Development Bank (ADB). It started in 1982 and completed in 1987. The source of water for canal irrigation is Yamdi khola. The length of the main canal from head work (HW) is 2.0 km. in which about 800 m. covered by concrete slabs. The length project branch canal and WUA made branch canal is 6.7 km and 1.2 km. respectively. In other words, the total length of the project irrigation system is 9.9 km.. The discharge capacity of the main canal is 1.50 cumec per second. The actual cost of expenditure to complete this project was of 1,46,74,000 NC. The main target of this project was to irrigate 320 ha. of land of command area but, net irrigated area is 235 ha. in summer serving about 803 beneficiary households and only 20 ha. in winter season as pointed out by the official key-informants.

The main components of the project include ,46 meter long bear type Head Work on the Yamdi Khola, with 2 under sluice gate, 8 footbridge cum super passage, the project office at ward No. 4 and a guard quarter near HW. To

make sure for the effective distribution of water, 10 outlets are provided at the main canal, from which branch canals are connected and a number of outlets are provided at each branch canal , from which the farm canals are connected (see map- 2). Some small and marginal farmers of ward no. 1, 2, 3 and 4 have made a sub-branch from branch 2 for irrigation through their own and WUA participations initiations. Some cost of construction is provided by the DIO. The length of this sub-branch is approximately 1.2 km which provides irrigation for 20 ha. of land as pointed by the WUA officials. The project has brought happiness and prosperity to the farmers of command area. The following table would clearly illustrate the existing canal system of the HIP.

Table No. 13 Distribution and description of canal system

Canals No.	Length(km)	Discharge Capacity (cumec/sec)	Command area Project target (Ha)	Date of Construction
Main canal from HW	2.0	1.50	320	1982/87
Branch 1	1.0	0.15	30	1982/87
Branch 2	2.2	0.55	110	1982/87
Branch 3	1.5	0.30	60	1982/87
Branch 4 (A)	0.5	0.15	30	1982/87
Branch 4 (B)	1.5	0.35	70	1982/87
Sub-branch of 2	1.2	-	20	1993/96
Total	9.9	1.50	320	

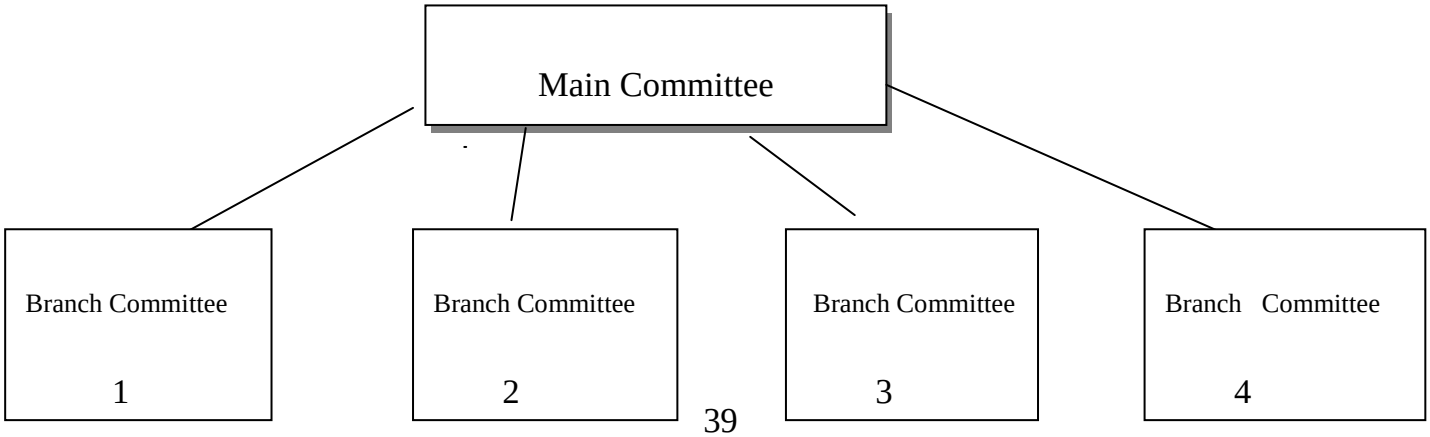
Source: Irrigation development division no-2 Office, Pokhara, 2011).

5.3 Water Users Association

The water Users Association was first registered in 1992 and now it is existing as a formal organization. Two supervisors , 4 Dhalpas and 1 Guard are the staff of HIP for the effective distribution of the water in canal. There has been formed a main committee of WUA and 4 branch committees of the beneficiary farmers of command area. The Hemja Irrigation system currently is managed by the joint venture of Western regional irrigation development division no.2 and WUA. The same division is contributing the technical and financial support to the WUA's main committee for the maintenance and repairing of the HIP system.

The main responsibilities of WUA are distributing the canal water equally among the users, maintaining the facilities of the system effectively solving conflicts among its members and mobilizing the resources , working as an extension of cleaning and repairing the system of HIP with farmers' participation as well as people's participation are the main responsibilities of the WUA. Other responsibilites are to communicate message from / to beneficiary households, advising the farmers of the date and place of general assembly meeting, emergency meetings and other meetings announce the mobilization of labour for the canal maintenance, collaction of fine and monthly contribution with the concerned farmers for guards salary. Canal water scarcity is main cause of conflicts among the users. It also settles the conflict between various stakeholders.

The WUA's main committee has 9 members and for branch committee canals 1, 2, 3 and 4 have 5, 9, 5 and 5 members respectively.



CHAPTER VI

SOCIO-ECONOMIC IMPACT OF HIP

It is quite obvious that any project launched at any community would effect on socio-economic life of the inhabitants. HIP has also effect on socio-ecomonic aspect of the command area, hence this project has impact on various fields is found in the command area. An attempt has been made to analyze the impact of HIP in this chapter. The purpose of this chapter is to focus on the analysis and interpretation of the collected data by the descriptive way about this study and it is also very important for the achievement of the above mentioned objectives of the study. In other words, this chapter, deals with impact of the HIP in connection with the direction and magnitude after implementation of the HIP by the comparison of before and after the project, it help to show the socio-economic and cultural changes of the command area by the causes of HIP . This chapter helps us to find out the problems of the farmers. The actual conditions of the canal system, the management procedure of the system, the socio-economic and cultural condition and the changing trends of cropping pattern of farmers of commmand area after the implementation of HIP.

6.1 Social Impact

This section tries to reflect the impact of HIP on social issues, which includes impact on woman, treatment pattern, toilet facility and the impact by HIP on social, educational political and cultural status of people in the command area.

6.1.1 Impact on women

Nepali women constitute more than half of the country's population but they remain discriminated and are treated as second-class citizen. This is due to the continuing dominance of the patriarchal value system, which originates from

the culture that always considers women inferior to men. There has been very little change in the status of women even after the implementation of the Hemja Irrigation Project.

Likewise in Hemja Irrigation project area, women suffer from institutionalized discrimination reinforced by custom and prejudice they are not treated equally as men. Moreover, they have to perform their roles in family as mother and wives for which they are not financially compensated. The status of female involves in relation to the occupation, education and decision making process. In the study area female constitute 51.86 percent of the total sample population. There is discrimination on wage for equal job. The wages of a man is higher than the woman. Most of the women were not enjoyed by access to land and productive resource, employment and participation in organization. It is found that Brahmin cast group has more dominant in their decision making process with male then female in comparison to other ethnic groups. Therefore the decision making role of woemn is lower then male in the study area . During the study period researcher observed that the status of women in lower cast (Kami, Sarki, Gaine,and Damai) group has poor status in comparison to higher caste group .

Since long ago women were engaged in farming, animal husbandry, raring and caring of their children, bringing drinking water and doing other household work. The land was cultivated only for seven months throughout the year and the land was fallowed for 3 months. So the workload wasn't a lot compared to the implementation of the project. After the implementation of the project, people started cultivating their land through the whole year. So as they startede working mnore, they got less time for themselves. Before the irrigation, women had 3 months where they didnot had to work in the farm. So in these time these women used to visit their family, used to go to temples etc. Now the same women who once had time to do all these, has hardly any time for themselves. Apart from agriculture farming, animal husbandry, raring and caring their children, bringing drinking water and other household works, now they have to go to the market to sell the vegetables, as they started to plant vegetables as a cash crop. They also have to participate in canal maintenance. The negative impact the irrigation project brought is that the workload of the women got increased this might effect the raring and caring of children.

Before the project women didn't used to get any opportunity to participate in any meeting, training and or any decision making position according to the respondent's and key informants, now there are 7 women who are engaged in water user committee. About 25 percent of woman got an opportunity to participate in different training like kitchen gardening, health and sanitation, adult deucation, operation and maintenance of canal, cash crop farming etc (data is based on informal verbal communication). Organized by the project, It is found that Brahmin cast group has more dominant in their decision making process with male then female in comparison to other ethnic groups. According to key informants, some of the women are found more active to solve their social problems by direct participating in the mother groups, women society etc then earlier women and the women's traditional roles in the family and their status is improving day by day after the implementation of the project.

6.1.2. Impact on social status

Social status can define as the position and reputation of a person in a society. A person or household was known as respected, rich and reputed, who had owned more Khet and Khar-Bari. According to the respondents, it is said that the people or household who used rice as their main diet regarded as rich and respected one. The social status of such people was also high. The people who used millet and maize as their main diet, was regarded as poor. They regarded themselves inferior in front of the people who used rice as their main food. The relation between them was just like a master and servant. The poor people work as a cheap labour to the rich ones field to manage their hand to mouth .

Before project most of the respondents used Millet and Maize as their main diet. There wasn't enough rice so people used to eat food made of millet and maize, it used to be special for people (specially for children) to eat rice. They used to eat rice only in festival after the project, people started harvesting more rice so eating rice wasn't so special any more. As started triple cropping pattern and started planting vegetables their income started increasing.

When the product has increased people started to sell this product in the market. As they started going outside of their world, they started meeting new

people this encouraged them to adopt new ways of life. They enjoyed watching movies, listening Hindi and western music. This brought a change in their traditional clothes and their life styles. Instead of wearing traditional cloths like Dhoti, Phariya, Khasto, Lungi, Ghalek, Gunyo Cholo, Daura Surwal, Topi etc they started wearing western cloths like Jeans, Paint, Shirt Kurtasurwals. Now jost of the unmarried girls are found in Kurtasurwal. This change brought them less interested towards their traditional culture and traditítonal social institution Rodhi Ghar. We can see this as a cultural impact that the irrigation brought.

When the agricultural production increased. They start selling agricultural product they starting earning more money then before. Their thinking is also changed; instead of sending the child to working in the farm, they started to send their child in school. Some are even sending their child to Pokhara for better education . As the children get better education they will make their life better then for sure social status will increase. After the introduction they have to participate in WUA's meeting, participate in Canal maintenance and other social work. Such meeting and participation in several social works makes them active, thich helps to improve their social status.

It is also came to know that the people who have more Kharbgari and grazing field, they didn't had to go to the jungle to collect grass for animals. Usually woemn and child were involved in such work. The status of women was regareded as high, woh didn't had to go jungle to collect grass, wood and brought the animals for grazing. Every family was interested to give the hand for their daughter with such people who had more Khet and Kharbari. Before the project, people used to give priority for cultivated land and production of rice whole in the time of mate selection for marriage rather then education. According to the respondents and key informants, only the people, who had enough Khet, send their child for higher education to the nearby city Pokhara. Whereas other people who didn't have khet, wanted to invest money to buy the Khet rather then the higher education of their child because everybody had intention to improve their social status.

6.1.3. Impact on Work load

There is various impact we saw in the people of command area, in which work load is one major impact. Work load is mostly dependent on the varieties of crops grown in the field cropping intensity is also equally responsible for the work land of the people . In this connection people had little to do before the introduction of HIP and the land was cultivated only6-7 months throughout the year people had enough leisure time so they used to spend the leisure time in gathering firewood, collecting grass, looking some part time job in nearby city like Pokhara , grazing cattle etc. Anyway, people were less busy due to the less work land among the inhabitants before operation of HIP .

The cropping pattern, crops variety as well as cropping intensity of the cultivated land have changed with the advent of HIP. The land is cropped throughout the year that needs more labors. The crops like paddy, seasonal and upseasonal vegetables need more labour in every season. That is why; the farmers hve become more busy in the field. As said by the farmers, the triple cropping pattern made them more busy. They always have to hurry up to follow the next crop after the first crops.

6.1.4 Social Interaction

The number of households and the population was limited in the command area before the operation of HIP. Every households was known to each other. Most of the time males were engaged in playing cards and Carom Board whereas the females had enough time in wandering up the neighboring houses people were able to pay attention towards every social works performed in the village which meant the keen relationship among the villagers. The flows of permanent migration after the operation of HIP increased the population density in the command area knowing to each other became difficult. The cultivation became possible throughout the year. Farmers started devoting more time in their field rather than playing and visiting around the village. Because of work land increased in the field, farmers are unable to devote much time in the social activities. On the other hand the number of youth for foreign employment is increasing day by day so there is lack of enough labour within the society. But people often meet together in the general assembly and regular meeting of ways.

The beneficiary households are engaged in various non governmental organization , micro credit programs and literacy program had been operating in command area . People of other religions as Christian, Buddhism, Muslim also increasing day by day. However peoples interest on various religious and social activity as Puran, Mahayagya, Various worship to god and goddess seems to be more and more day by day. Among with the increasing awareness and cross cultural activity among the people mixed of various cultures, religious groups, tradition the traditional social beliefs as Chuwachut (untouch), Bali partha etc.seems to be weakened . Gradually love marriage , intercast / interreligion and long distance marriage is being popular and child or early marriage system is extint. The Marriage ceremony, Bratabandha, the festivals like Dashain ,Tihar celebrating is being costly but it is helping people for social cooperation, harmony and interaction. All the above mentioned activities are the good opportunities for interacting among the villagers.

6.1.5 Social situation

Social situation in terms of literacy and community decision making was different than it is present days. There were only few schools in the command area. Those schools were poor in the physical facility including subject teachers. Therefore, the farmers who had good economic condition used to send their kids elsewhere for better education . No, literacy class for old people and women has been conducted. Most of the females were illiterate. The community thus was weak by the point of view of education. Now many Govt and private schools , adult education, women literacy , education programme for those who are out of school is operating. Girls and boys are treated equal for education. So, the literacy rate is increased which is more than national figure.

Social harmony and community decision making practice is one of the characteristics among the rural people which is also prevalent in the HIP command area. Most of the village level decision is done through the community. The villagers participate activity in all the issues. Discussion would placed on the floor and output would coma after the through discussion. Single manb decision making practice is disappeared. Lastly, it can be said that the HIP made people educated that effect is the community decision making. Education causes the social inclusion, harmony, peace and

justice is encouraged. This plays crucial role for social and economic development of the command area.

6.1.6 Health and Sanitation

During the study the researcher find a vast difference on various health and sanitation activity before and after HIP.

6.1.6.1 Toilet facility

Before irrigation project, most of the households did not have toilet. Household without toilet were asked why they didn't have toilet in an open-ended oral question. The main reason given by respondents, who didn't have toilet, was lack of perceived need for one and they had no habit of using toilets and next there were many open space and trees/ bushes. They used to go near the jungle, stream and public open place for toilet. After the irrigation program most of the open areas were converted into Khet so that there was a problem to go to open places. The project also provided the training facility about water and sanitation then they started to construct toilet. Some of the household construct toilet with Gobargas. The following table gives figure of toilet facility available in the HIP area of sample household.

Table no:14

Toilet facility before & after project

Facility available	Before project		After project	
	No of households	Percent	No of households	Percent
Toilet	12	15	69	86.25
Toilet with Gobar gas	0	0	8	10
No Toilet	68	85	3	3.75
Total	80	100	80	100

Source: Field survey,2010.

The table above shows that majority of the households had no toilet facility before the project among the 80 sampled household only 12 household (15%) had toilet facility whereas 85 percent household had no toilet facility. But, after the project 86.25 % household have only toilet and 10 % household have toilet with Gobar gas likewise 3.75 percent sampled households have no toilet facility available even today. These people still use open toilet. It is observed that most of the Dahar open spaces were clean, except all the lower cast community area. There are no public toilets in the study area.

6.1.6.2 Treatment pattern

Health is wealth so by the nature and structure of human body, treatment is most important for human being. We need treatment to maintain our health. So we use different kinds of treatment such as doctor faith healer (Dhami Jhakri) herbs etc that is accessible in the family and community. Due to increase in household income, training program regarding health and sanitation provided by project and used of nutrient foods may have show a positive indication towards the change in traditional treatment pattern see table no.15.

Table no.15

Distribution of respondents by treatment pattern

Treatment pattern	Before project 1986		After project 2010	
	No of households	Percent	No of households	Percent
Hospital/health post	23	28.75	41	51.25
Medical hall	27	33.75	26	32.50
Faith healer	30	37.50	13	16.25
Total	80	100	80	100

Source: Field survey,2011

The above table shows the changed treatment pattern of disease in two different times. There are 28.75 percent, 33.75 percent and 37.5 percent respondent who used to go to hospital, local medical hall and faith healer respectively before the project buty after the implementation of the project isw is found that the proportion of hospital/health post visitors are increasing that is 51.25 percent, 32.50 percent and 16.25 percent respectively. Due to the high income, education and awareness training provided by the project, the positive change towards the treatment pattern is seen. But till now 16.25 percent people still visits faith healer . According to the respondents and key informants, people still visits faith healer, because of the traditional concept, superstitions and culture. Some of the educated and rich families also visit both faith healer and doctors. But some uneducated and poor respondents specially (lower cast) visit faith healler not only by the culture, belief, tradition but lack of money too. According to them , visiting faith healer is due to their circumstance.

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6.2. Economic Impact

There is various impact of HIP on economic issues, which includes impact on cropping pattern, labour system, production and productivity , food habit and sufficiency, land value etc. of the people in the command area.

6.2.1 Impact of Irrigation facility

Irrigation is mainly a device to supply the necessary amount of water required to the plants of cultivated land . The best way of meeting such kinds of requirements is by constructing irrigation canal from the source of water. Irrigation has played an important role for increasing the agricultural production , Irrigated area as well as cultivated area. The Yamdi khola has provided the irrigation facilities in the cultivated area of ward no 1,2,3,4 and 9 of Hemja VDC, during the last twenty four years through HIP.

6.2.1.1 Irrigation facilities and its area before HIP

Some of the land of this area was irrigated by the Chaurasi kulo (Indigenous canal) in the summer season only but the water was not sufficient for irrigation. Most of the cultivated land of the study area was barren and meadow before Construction of this project .Most of the area had to depend upon the monsoon for the transplantation of Paddy as well as the irrigation supply in cropping land. The agricultural production and irrigated area have been increased after the operation of HIP . The following table contains the availability of irrigation facility in the study area before the construction of HIP.

Table No.16

Distribution of the respondents by use of Irrigation before HIP (1986)

Answer	**Frequency**	**Percent**
Yes	64	80.00
No	16	20.00
Total	80	100.00

Source Field Survey, 2011.

The above table 16 indicates that the 80 percent farmers had practiced irrigation facilities and 20 percent farmers had not used irrigation before the construction of HIP. There was no any regular means of irrigation except Chaurasi kulo, which irrigated the limited land of ward no 9, 4 and 3 of the study area in the summer season only . Most of the farmers of the study area had to depend upon the monsoon for the transplantation of paddy as well as the irrigation supply in the cropping land . Sometimes, the quarrels appeared among farmers due to the lack of sufficient water . So the farmers were unable to transplant paddy in due time .

Mostly, the farmers of the study area had been using the source of water of indigenous kulo, Yamdi khola and rainfall for irrigation. Thus the farmers of the command area used to transplant the low quality and low productive type of paddy in limited area (as Anga, Jhauri Ghaiya etc, in native). Most of the cultivated land were used for the transplantation of maize and millet, somewhere vegetables were cultivated in limited area for only the household

consumption . But indigenous kulo had provided the irrigation facilities in limited cultivated area. The area of cultivated and irrigated land before HIP (1986) is illustrated by the following table and figure 1.

Table No 17

The area of cultivated land and irrigated land before HIP by wards.

Ward No	**Total cultivated land (Ropani)**	**Total irrigated land (Ropani)**	**Irrigated area in percentage**
1	315	140	44.44
2	205	66	32.20
3	130	45	34.62
4	257	84	32.68
9	262	119	45.42
Total	1169	454	38.84

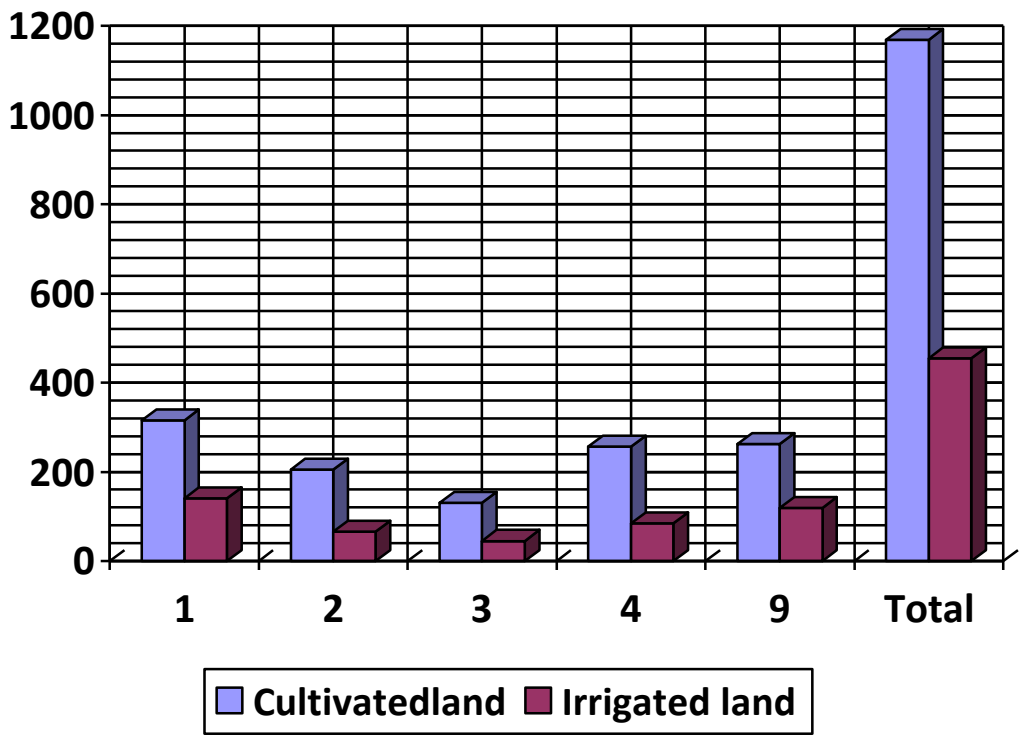
Source: Field Survey, 2011.

According to the above table, it indicates that the highest percentage of Irrigated area was in ward no 9 where 45 percent land was irrigated. About 30 percent land was irrigated in ward no 2 which is the lowest figure in this study. Similarly in ward no 1, ward no.3 and ward no 4, irrigated land was 44 percent 35 percent and 33 percent respectively.

As whole, irrigated area before HIP(1986) was 39 percent of the total cultivated land in the study area ,in which most of the irrigation facility was provided by the indigenous kulo (i.e Chaurasi Nahar) in summer season only for transplantation of paddy. In short the irrigation facility was in a very poor condition in the study area before HIP (1986).

figure-1

Area of cultivated land and irrigated land in 1986 (Before HIP),



6.2.1.2 Irrigation facilities and its area after the construction of HIP (in 2010)

Irrigation is as lifeblood for producing various types of crops and vegetables. It is artificial water supply to the field from streams and rivers which is linked by canals or pipes. Paddy and vegetables need sufficient water for their good growth and production.

The HIP has been providing the irrigation to Hemja VDC since 1986. But all cultivated land of this command area has not yet been irrigated due to the lack of sufficient source of water and lack of branch and sub branch canals . Some small and marginal farmers of ward no 1,2,3 and 4 (command area) have constructed sub branches and farm canals to irrigate uplands in their own and WUA participation and initiations . DIO and local functionaries have provided technical and financial supports to the construction of sub-branches . After providing irrigation facilities it has brought rapid prosperity and happiness to the farmers of the command area.

The length of the main canal is 2.0 km, it has the discharge capacity of 1.50 cumec/sec. which about 800 meters is covered by concrete slabs.5 outlets are provided at the main canal from which 5 branch canals are connected and number of outlets are provided at each branch canal for the effective distribution of water to the farmland .

Irrigation facility is not adequate in ward no 1, north east part of ward no 9 and eastern part of ward no 2 at present , In this area, Irrigation facility is done for only the transplantation of paddy by HIP. Thus the production of paddy and vegetables is lower in the ward no 1,2 and 9 than the ward no 3 and 4 . In fact the whole cultivated area of the command area has not yet completely been covered with irrigation by HIP .

In this study, Irrigated land refers to the total holding irrigated land of the sample households which include irrigated land within and out of the command area. Some irrigated land outside the command area is irrigated by stream and by Chaurasi Nahar.

Most of the irrigated land of ward no 1 eastern part of ward no 2 and north east part of ward no 9 is using the irrigation facilities for only the transplantation of Paddy . This type of land is also included in the irrigated land . The following table and figure 2 shows the area of cultivated land and irrigated land after the operation of Hemja Irrigation Project.

Table NO 18

The area of cultivated land and irrigated land by wards after HIP

(based on sample households in 2011)

Ward NO	Total cultivated land (Ropani)	Total Irrigated land (Ropani)	Irrigated area in percentage
1	321	152	47.35
2	209	148	70.81
3	136	125	91.91
4	261	193	73.95
9	267	136	50.94
Total	1194	754	63.15

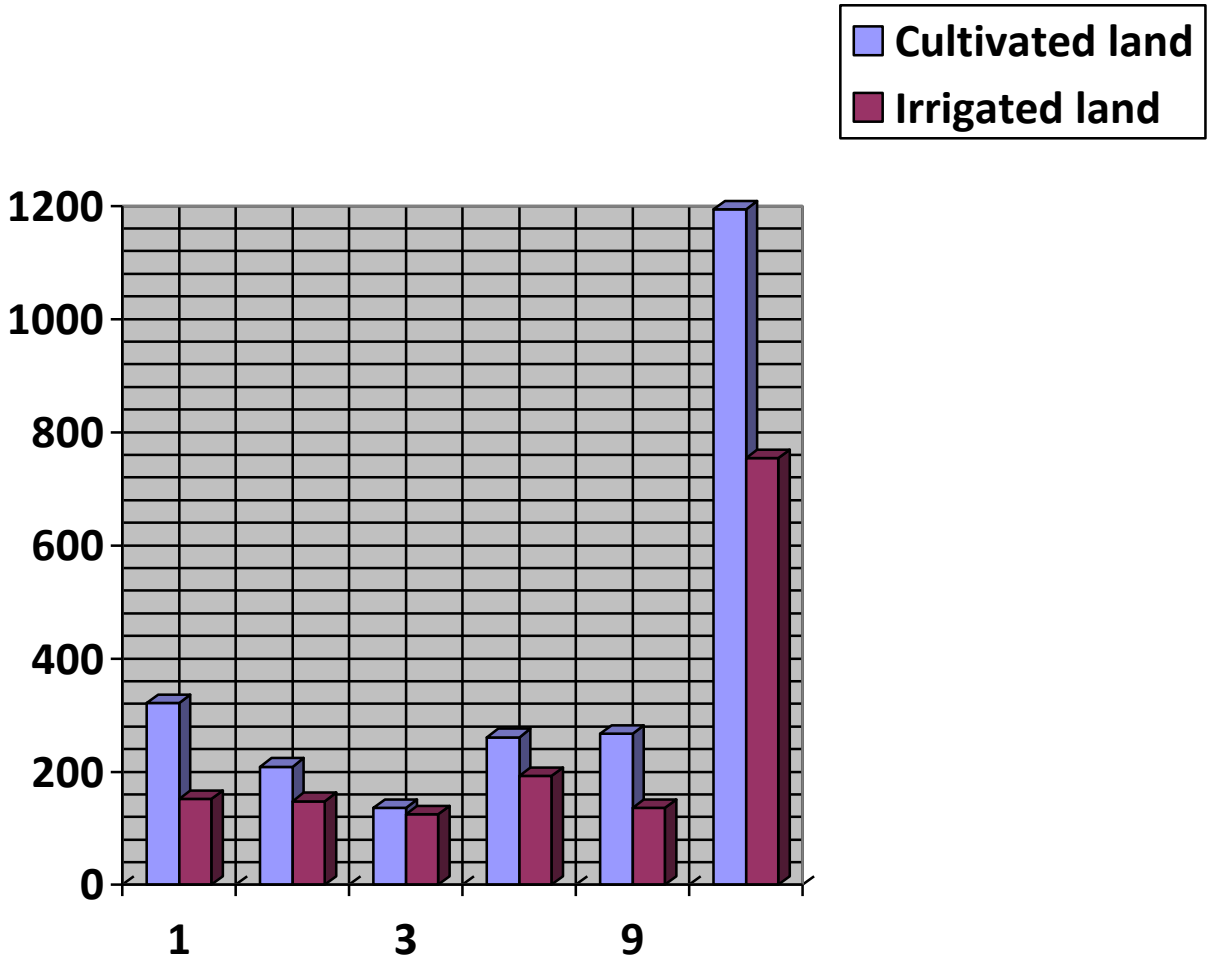
Source Field Survey ,2011

The above table and figure 2 indicate that the highest percent of irrigated area is in ward no.3, where 92 percent of the land is irrigated. About 47 percent of the total cultivated land is irrigated in ward no.1, which is the lowest figure in this study . Similarly, irrigated land in ward nos.2, 4 and 9 is 71 percent, 74 percent and 51 percent of the total cultivated land respectively.

As a whole, only 45 percent of the total land holding of the sample household has been provided irrigation facilities by the HIP only in the summer season but in winter season only 30 ha. land has been provided irrigation facilities due to the lack of water at the main source as well as available water leak from the headwork of the system.

Figure 2

Cultivated area and irrigated area after the construction of HIP (in 2011)



6.2.1..3 Changing Trends of Irrigated Area before and after the construction of HIP (1986-2011)

Irrigation facilitates to increase the productivity of cultivated land. It means that irrigation brings changes in cultivated area as well as increased irrigated area.

Before the construction of HIP (1986) the water distribution of Chaurasi kulo was irregular and insufficient . But after the construction of HIP (1986) the water distribution of HIP is more or less regular and sufficient in summer season only . The HIP is being run under the joint management of Kaski District Irrigation Office and WUA of the same project. WUA assists in appropriate distribution of water to all the branches and the users turn (as availability of water in the main source) from the available supply .

The irrigated land of the study area before (1986) and after (1996) HIP is illustrated by the following table and also it indicates the increasing percentage of the irrigated land from 1986 to 2011 in the study area.

Table NO. 19

Irrigated area before and after HIP and increased percentage by wards (1986-2011 Based on sample households)

Ward No	**Irrigated area in 1986(in%)**	**Irrigated area in 2011(in%)**	**Increased in percentage**
1	44.44	47.35	2.91
2	30.30	70.81	40.51
3	34.62	91.91	57.29
4	32.68	73.95	41.27
9	45.42	50.94	5.52
Average	38.84	63.15	24.31

Source Based on Table nos.17&18

The above table has indicated the irrigated area during 1986-2011. In ward 3 the irrigated area has increased about 57 percent after the introduction of HIP,

which is the highest percentage of the increasing irrigated land in this study and ward nos. 1 and 9 which have the lowest percentage of the increasing irrigated areas after the construction of HIP .ie .3 percent and 6 percent respectively. Similarly about 41 percent and 41 percent irrigated land is increased in the ward nos 2 and 4 respectively.

In 2011 about 63 percent of the total cultivated land has been irrigated but this figure was only 39 percent in 1986 (Before the construction of HIP) . It means the irrigated area is increasing up to about 24 percent in the study area due to the construction of HIP but it is not continuous throughout the year.

6.2.2 Cropping pattern

The cropping pattern would be changed by the adoption of new technology such as irrigation facility improved seeds, technical knowledge etc. In the context of our country, the arable land is limited , but population has increased by 2.24 percent per annum (CBS 2001) from 1991 to 2001. There is a great problem of food and employment faced by the nation due to the rapid increase in population. To solve this problem the quantity of agriculture production must be increased with the proportion of population growth by the adoption of new techniques or methods. Irrigation facility in the studyhas influenced the cropping pattern so that is different before and after construction of HIP.

6.2.2.1 Cropping patterns before the HIP

Before the construction of HIP, irrigation facilities were insufficient and irregular so the crop production depended on the monsoon or rainfall in the study area. In that case diversified cropping pattern was not acquired there. Various types of crops were produced in the percentage of total production as shown in following table no.20.

Before the construction of HIP land was categories into two types i.e. Khet and Pakho. In the Khet, paddy cultivation was dominated in the summer and some where maize in summer, wheat and potatoes were grown in the winter season. Most of the Khet land was remain fallow after the harvesting of

paddy. In the Pakho land , maize and millet were produced in the summer and winter respectively. Millet and maize were the dominated crop. Besides this crops oil-seed, potatoes and vegetables were cultivated in the limited area for only the household consumption. Most of the Pakho lands were remained fallow except at the cropping time of maize and millet. Inspite of this, considerable area of ward no.1, 2 and 9 was left meadow throughout the year. The following table illustrates the rank of crops between 1986 and 2011 on the basis of percentage of total crop production in the study area.

Table No. 20

percentage of crop production and its ranking between 1986-2011

Types of crops	Before HIP(1986)		After HIP(1986)	
	Production %	Rank	Production %	Rank
Paddy	57.03	1	62.14	1
Wheat	4.50	4	4.41	4
Maize	16. 76	3	7.00	3
Millet	18. 67	2	3. 09	5
Oil seed	0.50	6	1.22	6
Vegetables	2.54	5	22. 14	2
Total	100.00		100.00	

Source: Field survey, 2011

According to table no. 20 the most dominant crops were paddy, millet, maize, wheat and vegetables in 1986, produced about 57 percent, 19 percent, 17 percent, 5 percent and 3 percent of the total crop- production respectively. It shows that paddy was the first rank of crops, millet was the second rank crop. Similarly maize, wheat and vegetables were the third, fourth and fifth rank respectively. The production of oil- seed was negligible which ranked last in the hierarchy.

6.2.2.2 Cropping pattern at present:

After the construction of HIP, there is change in the cropping pattern due to the increase of irrigation facility in the study area. About 63 percent cultivated lands have been irrigated after HIP, which was only 39 percent before HIP. Various types of crops have been grown and their production has also been increased due to the availability of more irrigation facility so there has been a change in the cropping system as the comparison before and construction of HIP. At present there have occurred diversified cropping patterns in the irrigated land of the study area. As a whole, various types of crops such as paddy, vegetables, maize, wheat, millet, oil-seed and so on are cultivated in respective seasons.

At present, land is categorized in two types i.e. irrigated land and non-irrigated land. In the irrigated land, paddy and vegetable cultivation is dominant . Wheat, oil-seed and vegetables are cultivated during the winter season in that land. Besides these, pulses, are also cultivated in limited area during winter. In the non-irrigated land, maize and millet cultivation is dominant in the summer and winter season respectively. Besides these, potatoes, groundnuts, oil-seed and limited vegetables are also cultivated in the limited area on the seasonal basis which is depended upon the monsoon of the year.

According to the above table 18 the most dominant crops are paddy, vegetables, maize, wheat, millet and oil- seed. There crops occupy about 62 percent, 22 percent , 7 percent , 4 percent, 3 percent and 1 percent of the total crop production respectively.

At present, paddy is produced as the first ranking crop and oil- seed stands as the last ranking crop in all wards of the study area. In ward no. 1, 2 and 9,

maize is produced as the second ranking crop while the third ranking crop is millet except in ward 9, in which vegetables are the third ranking crops and millet stands in the fifth ranking crop production. Vegetables are produced as the second ranking crop in ward no.3 and 4 while the third ranking crop is maize in these wards.

As a whole vegetable production is increasing in the study area and it is also uplifted in the rank 2 after HIP, which was in the rank 5 before the construction of HIP (in 1986). The cropping pattern has been diversified as result, the farming of other verities of crops under the subsistence agriculture system. Similarly bicultural cropping system and polycultural cropping system have been introduced in the study area, where, some farmers are producing more than four crops a year but its volume is limited. Some farmers have grown three types of crops (such as maize- paddy- wheat or maize-millet-vegetable) to initiate polycultural cropping system. Most of the farmers of ward no.2 have grown two types of crops as paddy and vegetables to indicate the bicultural cropping system. They also produce the different types of vegetables in a year from the same land. Farmers are trying to convert their agriculture from monocultures to bicultural and polycultural cropping system in the study area. The following table shows the existing diversified cropping patterns in the study area ward by ward.

Table No. 21

Present cropping pattern (in 2010) by season

Ward No.	Summer	Winter
1	Maize/Paddy/Millet	Vegetable./Wheat/Fallow
2	Maize/Paddy/Millet	Wheat/ Veg./ Oil-seed
3	Veg./Paddy/Maize	Veg./Wheat
4	Veg./Paddy/Maize	Veg./Wheat/Oil-seed
9	Maize/Paddy/Millet	Vegetable./Wheat/Oil-seed/ Fallow

Source: Field survey, 2011.

6.3 Labour system in agriculture sectors

Though recently the modern method of farming and using tractors for plowing and other machines for farming and processing is introduced. In the context of rural area of hill region, almost the total agro-produced by using the manual and animal labor system. The study area has been located in semi urban hill region so most of the farmers are using human and animal labor to meet the labor needs for farm operation. Almost every member who are in the home is participated throughout the year in the process of farm operation. Such as preparing the farmland, seeding, sowing, transplanting from nurseries, manuring, weeding-out, harvesting, threshing and winnowing which process is done mainly by the animal labor and human hand.

After the introduction of HIP, irrigated land has been increased and introduced the multicultural cropping pattern as well as increased the demand of agricultural labor in the study area. Vegetable farming is rapidly introduced as well as commercialized more in ward no3 and 4 of the study area and the area of paddy cultivation is increased after the HIP. The overall agricultural labor availability in the command area is reported and understood as balancing at present but the trend is decreasing due to the schooling; increasing trend of foreign employment as a wage labor and other sectors and increasing the area of vegetable and paddy farming.

In short, all the agro- production is produced through the indigenous manual labor system, in which it mostly includes labor system- use of own family members. Parma system and wage labor. These types of labor systems are used considerably throughout the year for the production of crops in the study area. Agricultural labor system was frequently repeated in the study area shown in the following table.

Table No. 22

Agricultural labor system practiced by sample house holds.

Labor system	Frequency	Percent
Use of own family members, parma and wage labor	46	57.89
Use of own family members and Parma	18	22.10
Use of own family members and wage labor	13	15.79
Use of wage labor only	3	4.21
Total	80	100.00

Source: Field survey, 2011.

Above table shows that a large number of respondents practiced three types of labor systems. That is about 58 percent respondents are using the labor systems as own family members, wage labor and parma system. Another 22 percent respondents use own family members and Parma system. Likewise, 16 percent of sample households use two types of labor systems as own family members and wage labor. Similarly, about 4 percent respondents use only the hire labor on the wage basis for cultivation of various crops.

We saw that about 78 percent respondents or farmers are using the limited number of wage labor for their farm operation. Most of the laborers are hired at the time of cultivation and harvesting of paddy. Out of this, a considerable number of wage labor is being used for cultivation of wheat, vegetables, maize and millet. One third of the total number of wage laborers who are hired throughout the year are male, who are working specially as a ploughman as well as thresh paddy. Similarly, two third of the total wage laborers are females in the study area. They are used for all the farm operation activities except the plougting of the land.

Generally the wage rate of male and female is Rs.150 and Rs.100 per day respectively for the same work in the study area. It shows that gender discrimination is appeared in the study area. The demand of agricultural wage labor fulfilled in the study area is by the lower level or lower size of land holding people of same area. Mostly the demand of agricultural labor is occurred highly in the transplantation and harvesting time of paddy.

6.4 Agricultural production and its areas before construction of HIP (1986)

Before the construction of HIP, most of the cultivated land of the study area was barren and meadow due to the lack of irrigation facility. Only 39 percent of total cultivated land was irrigated through the indigenous kulo and stream in summer season only (see table 23) but the water was not sufficient for irrigation. So the farmers of the study area had mostly to depend upon the monsoon or rainfall before HIP and they were unable to transplant paddy in due time.

In short, irrigation has played a vital role for increasing the agricultural production and it's area, irrigation facility was very poor and area of irrigated land was also limited before HIP. The paddy was a major crop in the study area. The farmers of the command area would plant paddy during the rainy season but most of the cultivated paddy was of low quality and of low productivity (such as Anga, Jhauri etc. in native) . In this area, maize, millet, oil-seed and wheat were grown as well as potatoes and vegetables were cultivated in the limited area for household consumption and somewhere these were produced as cash crops. In the past, farmers had hard life in agriculture due to the lack of irrigation facilities. The major crops were ranking as shown in table 18 before the construction of HIP. Which indicates the hierarchy of crops in descending order as paddy, millet, maize, wheat, vegetables and oil-seed respectively on the basis of their respective total production throughout the year .

In this study, production refers to the total agricultural production of major crops in the study area. Which includes the production of paddy, millet, maize, wheat, vegetables and oil-seed. At first, the food grain products were counted with local measuring unites i.e. Mana, Pathi and Muri and vegetables in Kilograms or in rupees then, later both were converted into rupees according to the local market price as reported by the respondents and key informants. The area of cultivated land and production of crops before and construction of HIP are given in table below.

Table No. 23

Agricultural production and its area before HIP

Ward No.	Total cultivated areas(in Ropani)	Total production (in Rupees '000)	Production (In Rupees/ Ropani)
1	315	280.3	890
2	205	199.9	975
3	130	146.9	1130
4	257	282.2	1102
9	262	263.8	1007
Total	1169	1173.1	1003

Source: Field survey, 2011.

The above table indicates that, the highest production rate was in ward no.3 where 1130 rupees per ropani was produced. The lowest production rate was in ward no .1 where it was only 890 rupees per ropani. The average irrigated area was 39 percent and average production rate was 1003 rupees per ropani.

In the ward no.3 and 4, some farmers practiced vegetable production in limited area which was a cash crop, thus its production rate was high. But in ward no. 1,2 and 9, most of the land was covered with the maize and millet due to insufficient water; thus its yield was lower. Besides this, most of the farmers produced vegetables in limited area for only their household consumption.

In short, The farming system was traditional .The study area had limited irrigated farm land i.e. 39 percent and its irrigation facility was in very poor condition. Owing to the agricultural production rate was also lower. It means the daily life of farmers of this area was relatively harder and more limited before HIP than at present (due to low irrigation, production, surplus and investment in production) due to low inputs and output in production.

6.5 Agricultural production and its area after the construction of HIP (in 2010)

Irrigation facility has brought a few changes in agricultural production, cropping area, cropping pattern as well as cultivated area after construction of HIP. Irrigation is essential for producing various types of crops and vegetables. Although Hemja irrigation Project has provided irrigation facilities in Hemja VDC since 1987, all the cultivated land of its command area has not yet been irrigated due to the farmers have not been able to get sufficient water for their cropping land . Thus the productivity or yield is not so good in the study area at present. However irrigation facility has brought a few changes area after the construction of HIP i.e in 2010. The major crops are ranking as shown in table 18, which indicate the hierarchy of crops on the basis of their respective production throughout the year. In which the irrigated land covers about 63 percent in the study area.

The following table illustrates the agricultural production productivity and cultivated area of the study area of the last year (2010)

Table No 24

Agricultural production , yield and its area of the last year (2010)

Word No	Total cultivated area (in Ropani)	Total Production (In Rs, 000)	Yield In Rs/Ropani
1	321	966.21	3010
2	209	658.35	3150
3	136	492.32	3620
4	261	1121.57	4297
9	267	780.44	2923
Total	1194	4018.89	3366

Source : Field Survey ,2011

According to the above table, The highest production rate is in ward no 4 i.e 4297 rupees per ropani. The lowest production rate is in ward no 9, where the average yield is 2923 rupees per ropani due to the limited capacity of

irrigation facility e.g only 51 percent area is irrigated in this ward as well as the major production which includes paddy , maize ,wheat and millet. Likewise in ward no 1, ward no 2 and ward no 3 the average yield of agro production is 3010 , 3150 and 3620 rupees per ropani respectively.

As a whole the production rate of ward no 4 and ward no 3 is high because the farmers of this area produce seasonal and upseasonal vegetables as a commercial type which are cash crops. In other words most of the farmers produce vegetables in the limited area for only the household consumption due to the insufficient water in winter so their major production includes paddy, maize millet and wheat owing to their lower yield. At last, the average agro production rate of the study area is 3366 rupees per ropani. Its total cultivated area is 1194 ropani in which about 63 percent land has irrigation facility in the summer season only for the transplantation of paddy . It means that water is not sufficient for all the irrigated land.

6.6 The changing trends of agricultural production before and after the construction of (1986-2010)

The trends of agro production have been changed in the study area due to the availability of irrigation facility through HIP.

As mentioned above in chapter one, water is an important requirement for the nourishment of plants and irrigation has played an important role in the production of crops, So no doubt to say the more irrigation facility higher agro production yield. Similarly the trends of agro production have been changed in the study area due to the availability of irrigation facility through HIP since 1987.

The trend of the total agro production or production yield is increasing day by day due to the use of irrigation facility, new technology and inputs in the cropping land. The following table illustrates the agro production yield before and after the construction of HIP in1986.

Table no 25

Trends of agro production yield before and after HIP (1986 &2010) by wards.

Ward No.	Production yield in 2010 (in Rs.)	Increase in percentage
1	3010	238.20
2	3150	223.07
3	3620	220.35
4	4297	289.93
9	2923	190.27
Average	3366	235.59

Source: From table Nos. 23 & 24

Above table shows that the agro production yield is very high at present than before the construction of HIP. The agro production yield is much increasing in ward no 4. and 1. It increased by 1102 rupees per ropani to 4297 rupees per ropani and 890 rupees per ropani to 3010 rupees per ropani which increased about 290 percent and 238 percent respectively. Similarly, production yield increased in ward nos 2,3 and 9 i.e about 223 percent , 220 percent and 190 percent respectively to their respective production yield before HIP (1986).

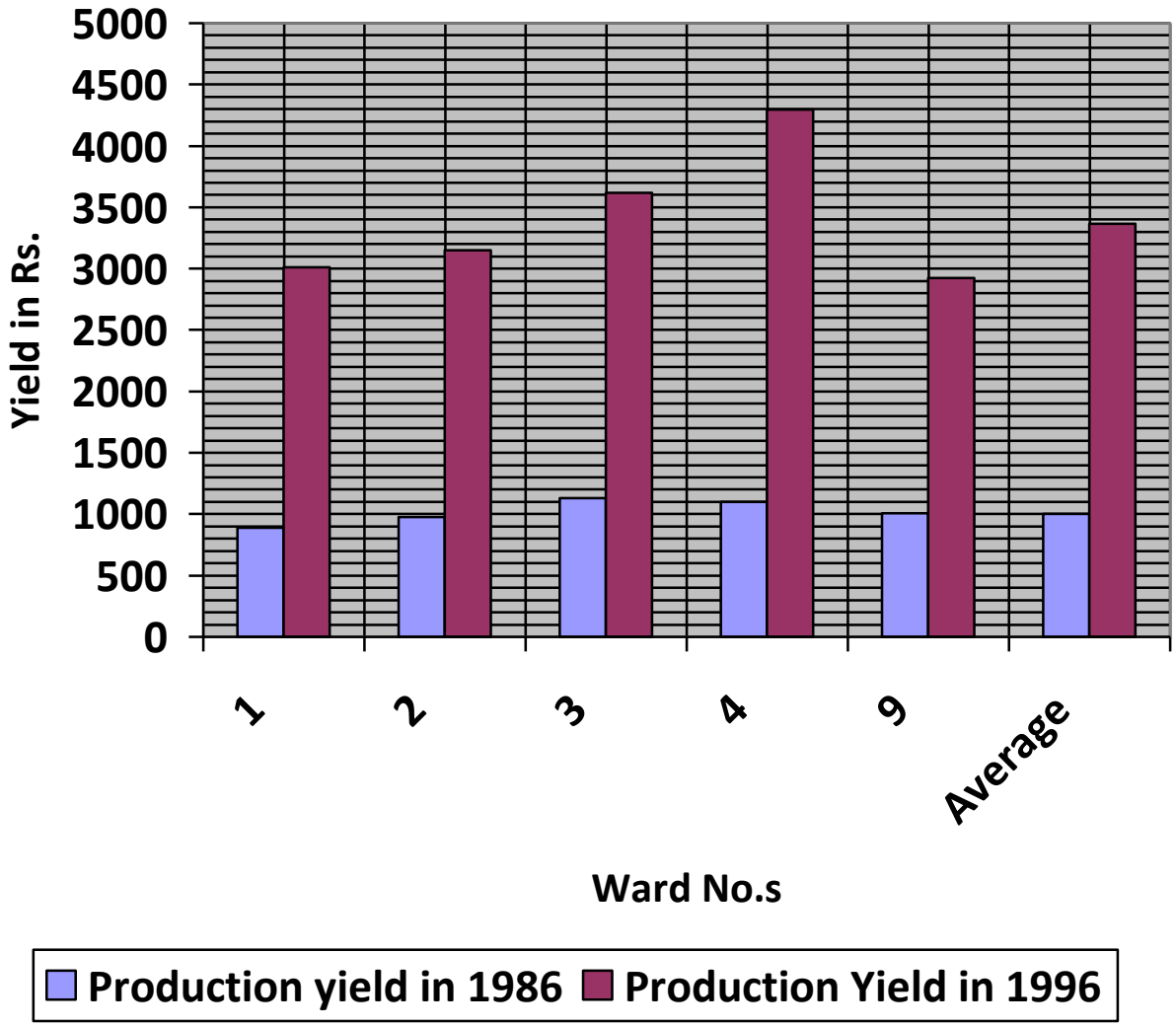
Inspite of the fact that more land was put under irrigation in ward no 3 the production level did not show similar trend. In ward no 4 which had relatively less incremental land under irrigation compared to ward no 3 the production level was noticed higher ward no 3 is dominantly a Chhetri settlement whereas ward no 4 is dominated by Brahmins .Chhetri male members have been absent from home for foreign duties whereas, Brahmins seemed to be more localized . This factor might have influenced farm management with less effect of irrigation water in ward no3 .

The fact is that after the increasement of irrigation facilities through HIP, there has been increasement in production yield at a highly satisfactory percentage in ward no 4 and 1 of the study area . But remaining wards of same area, increasement percent of production is not satisfactory because the farmers of this area are not practicing vegetable production as a commercial type due to the lack of knowledge about it and also lack of irrigation for vegetable yield at satisfactory percentage more or less in all parts of the study

area (see figure 3) The average increasement percentage of yield is about 236 percent of the production yield in 1986 of same area .

Figure-3

Crops production yield before and after the construction of HIP



Source: Field survey, 2011

6.7 Impact on agricultural production between 1986 - 2010 (Before and after HIP)

The trends of agro production have been changed in the study area due to the availability of irrigation facility through HIP., The food grain and vegetables are important agricultural crops in the study area. Farmers grow various types of summer and winter crops such as paddy, wheat, maize, uwa, millet, oil seed, fruits, different types of vegetables etc. In above crops, paddy, wheat, maize, millet, oil seed and vegetables including potatoes are the major crops in terms of consumption and quantity of production.

The following table shows the change in production of major between 1986 and 2010.

Table No 26

Total agriculture production in1986 and 2010

(i.e. before and after the construction of HIP).

Major crop	Total production (in muri)		Total increased percent
	In 1986	In 2010	
Paddy	990	1920	93.94
Wheat	80	170	112.50
Maize	325	290	-10.77
Millet	341	105	-69.21
Oil-seed	4	20	400.00

Source:Field Survey , 2011.

The trends of agro production have been changed in the study area due to the availability of irrigation facility through HIP .The above table No. 25 indicates that the total population of paddy, wheat and oil-seed is increased by the 990 muri to 1920 muri, 80 muri to 170 muri and 4 muri to 20 muri respectively between the year 1986 to 2010 AD. It means the total production of paddy, wheat and oil-seed is increased in 2010 by 94 percent, 113 percent

and 400 percent respectively of the total production of respective crop in 1986. But the total production of maize and millet is decreased by 325 muri to 290 muri and 341 muri to 105 muri respectively in the year 1986 and 2011. It means, the total production of maize and millet is decreased by 11 percent and 69 percent respectively after the construction of irrigation project (HIP).

The trend of production yields is increasing day by day due to the use of irrigation facility, new technology and input in the cropping land.

Besides this the total production of vegetable is increasing tremendously between the years 1986 to 2010 i.e. from 45000 rupees to 25,00,000 rupees. Before the construction of HIP, only potato was produced as a major vegetable but after the construction of HIP there is introduced various types of vegetables in the study area such as potato, tomato cauliflower, cabbage, beans, radish, cucumber, brinjal, carrot etc.

The changes of the crops production have brought the change in the daily food habit of farmers. Before the construction of HIP, most of the farmers were including the rice, maize and millet in the daily food but nowadays, they are mostly including the rice, wheat and vegetables in the daily food to maintain their daily physical activities. As a whole, the total production of agriculture is increased in the study area due to the changing trend of cropping pattern after the availability of irrigation facility.

6.8 Impact on food sufficiency 1986-2010

We find that in the study area, paddy, maize, wheat and millet are the major food grains giving crops, which grains are used in daily food of human for the subsistence before and after the construction of irrigation project. There had been produced lower quantity of the food grains in 1986 as compared to the present day production of it. So that most of the farmers have faced the problem of food deficit. But after the construction of HIP , most of the farmers are adopting the new technology and methods of practicing multicultural cropping pattern which promotes the total production of food – grain in the study area. Nowadays, food-grain production is increased about 48 percent of the total production of 1986. So that overall food situation is differed in the study area between 1986 and 2010 due to the availability of

irrigation facility. The following table shows the actual food grain situation of the study area before and after the construction of HIP.

Table No.27

Distribution of the respondents impact on food sufficiency between 1986 -2010

(Based on sample households)

Food Sufficiency	Before HIP (in 1986)		After HIP (in 2010)		% of total difference
Deficit	64	67.65	38	40.00	-27.37
Balance	26	29.41	32	33.68	+6.31
Surplus	5	2.94	25	26.32	+21.06
Total	95	100.00	95	100	

Source:Field Survey, 2011

The above table indicates that the overall food situation in the command area was deficit in 1986 and 67 percent households of the study area got suffered . Similarly, 29 percent households have been in balance of food grain throughout the year from their own product. It means the total food -grain production of 29 percent households were consumed by themselves throughout the year. They have neither deficit nor surplus from their own product. Five percent households have surplus of food grain from their own product it means the total food grain were consumed by farmers themselves a negligible percent of it was sold within the village of study area.

Likewise in 2010; 26 percent households of the study area have in surplus of food grain from their own product. 34 percent households have consumed their own product of food grain through the year for their subsistence and rest of the 40.00 percent households are suffering by the food deficit in the month May, June, July and August of the year. The farmers of the area generally supplement their food deficit by working as labor within village through vegetable farming and services.

As a whole the food deficit households are decreased by the 27 percent of the total sample households in 2010. Similarly, food sufficiency balance and surplus households are increased by 7 percent and 21 percent of the sample households respectively after the availability of irrigation facility through HIP.

It means 27 percent deficit households have been uplifted in the food sufficiency balance and surpluses households by 7 percent and 21 percent respectively after the completion of irrigation project.

Although the irrigation facility increased the cropping intensity and crop yield of the land in the command atrea, the data shows that 40 percent of the households are still failed to produce enough food from their cultivated land throughout the year.

6.9 Impact on land value

Land value is determined by different factors like migration, urbanization , availability of land, the cropping pattern and productivity of land etc. Cropping intensity and productivity of land is mainly depends on the land fertility and irrigation facility. An irrigation facility plays the crucial role in increase in the land's productivity as such.

Because of the lack of an irrigation facility, the command area has different cropping pattern before the implementation of canal. It's cropping intensity and productivity was also less than the operation of HIP. It's cropping intensity and productivity was also less than the operation of HIP. Therefore, the land value of the command area was less in the Past stage.

But the implementation of the HIP has changed the cropping pattern of the cultivated land. Apart from this it has also increased the cropping intensity as well as productivity of the land. Due to the above mentioned quality of the land facility, the people from other neighboring village attracted to migrate towards Hemja VDC. The Milanchock developed as a business center for some other village of the north Kaski District. The increasing flow of migrated people intervened the irrigation land. The completion in purchasing over the irrigated land gave rise to the increased in land price every year. The

land value increased more rapidly after the implementation of HIP. The comparative changes in the land value before and after the HIP is as follows.

Table 28

Land value of study area before and after HIP

Before		After	
Year	Rs. Per Ropani	Year	Rs.Per Ropani
1976	6000	1987	30000
1978	7000	1990	40000
1980	10000	1995	60000
1982	12000	2000	100000
1984	13000	2005	150000
11985	15000	2008	225000
1986	20000	2010	350000

Source: Field survey, 2011

The Above table, shows that the land value in 1985 was Rs. 15000 and in 1986 was Rs.20000. But the land value changed drastically after 1987. Since 1987 land value increased rapidly every year. In 1987 the land value was Rs.30,000 per Ropani which increased to Rs. 3,50000 in 2010. As said thekey informants and surveyed house holds, the land under the HIP lies in Abbal and Doyam Category.

6.10 Problems of agricultural system

In the study area, the farmers have faced the various types of general and serious problems in the whole agricultural system, which are related with irrigation system as well as cropping time in the farmland. Most of the respondents expressed the problem of insufficiency of water for irrigation in the paddy and vegetable crops in summer and winter season respectively due to the lack of sufficient branch canal and source of water in the Hemja irrigation system. The problems of agricultural system are categorized as follows:

- Distribution of water through HIP is not regular in all the branches and the users. So the farmers are unable to transplant and irrigate in due time.

- Water is insufficient at the main source in winter season because of the main source depends upon the rainfall. So the farmers of ward no. 1,2 and 3 are unable to be oriented towards vegetable production.

- The problem of water scarcity becomes acute in the summer season when water decreases in the main source, if it does not rain the problem of water scarcity is being felt throughout the year.

- The canal often suffers from soil settlement at different places along its alignment, which creates the problem in water distribution.

- There has been lack of maintenance, repairing and supervision of canal frequently. Due to this problem some covering slabs fell down many times and covered canal portion and seriously blocked the water supply and some wall portion of canal was damaged.

- Lack of sufficient budget for the repairing and maintenance of the system. This insufficient budget is not provided in due time by DIO.

- The head-work of the system was not constructed by strong concrete as perceived by the users. So some gabion work in the downstream of masonry core wall and under sluice of the head work site was swept away by the flood.

- Water oozes through the wall portion of the head work as shown in the photograph. Due to this problem water scarcity is increasing in the winter season.

- Distribution of water is not adequate and equitable due to this; the water is not available in the tail part of branch 2 and branch 4. So farmers of this area are unable to transplant paddy and irrigate in due time.

- There is growing a water related conflict among the farmers due to increasing the scarcity of water day by day.

- Sub-branch have not been constructed according to the needs of the farmers. Irrigation would be possible in the upland of ward no. 1 and 2, if the sub-branches were constructed in appropriate places.

- Lack of technician, extension worker in the study area i.e. J.T. and J.T.A. most of the farmers have the lack of technical knowledge and training about the agricultural production and use of agro-inputs.

- Agro- inputs may not be available in due time from the local distributors.

- Local vegetable producers are not o get satisfactory price from the sale of their production due to the free competition in the market of vegetables. So that there is a lack of systematic market of the vegetables.

- Lack of the cold store and warehouse in the study area.

CHAPTER VII

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Summary

The supply of water to the cultivated land through the use of any artificial devices is called irrigation. Therefore, irrigation is mainly a device to supply the necessary amount of water required to the plants of cultivated land.

Irrigation is not a recent phenomenon in Nepal. Because it has been practiced from ancient time by Nepalese people. They applied the traditional method, which depended on enormous labor force such as terraced method. But large scale canal irrigation is not a very old phenomenon in Nepal. The first Chandra canal was bilt in 1924 by Rana Prime Minister Chandra Shamsher. In recent times irrigation facility has been provided by various methods such as surface irrigation underground irrigation lift irrigation, sprinkle irrigation etc. such as surface irrigation has been introduced in large part of the country. The Hemja Irrigation Project is also a surface irrigation project. It is under the programe of first Hill Irrigation Project funded by ADB. The farmers of command area are trying to increase their productivity as a satisfactory rate since the construction of HIP .

Hemja Irrigation Project is located at Hemja VDC of Kaski district in Gandaki zone of western Development Region . The Pokhara Baglung Highway passes through the command area and linked with metalled road.

The project area is settled in different wards of Hemja VDC as ward No. 1,2,3,4 and 9, in which some portion of ward no. 1 and 2 has lack of irrigation facility.

There are 1088 houselolds resided Chhetri, Brahmin, Newar, Tibetan, Gurung, Damai, Kami etc. The dominant ethnic gtroup is Chhetri in command area. The total population of the command area is 4914. Majority of people of the command area are Hindus and the main occupation of them is agriculture.

More than 36 percent of the economically active population are involved in agriculture.

The literacy rate of study area is higher than the nliteracy rate of Hemja VDC. In the study area, literacy rate and acquired level of education of the female is lower than the male. But the number of females to the higher education is increasing gradually.

Total size of the cultivate land seems to have increased after the implementation of HIP .There is high disparity in the land holding i.e. in the study area, 12 percent of rich farmers occupy 35.69 percent of total land, whereas 45.26 percent of medium farmers occupy 52.08 percent land and only 12.23 percent of total land is occupied by 43.15 percent of marginal farmers. Land holding size is criterion for annual income of the farmers. Farmers who have the small size of land holding are having lower level of income. If the size of land holding is higher, then the level of income is also higher.

The irrigated area is increasing upto about 63.15 percent of the total cultivated land, but this figure was only 38.84 percent before the construction of HIP (in 1986). The increased availability of water has also greatly increased the cultivation of paddy, wheat oil-seed and vegetables, replacing the earlier staple food grains of millet and maize. Maize and millet are becoming less popular with the local inhabitants as more and more people convert their Pakho, Kharbvari, Chaur and other fallow land into Khet due to the availability of irrigation at present.

Because of the availability of irrigation facility (1986 onwards) the cropping pattern also has been slightly changed. Two crops in a year has become the rule. After the introduction of HIP, irrigated land has been increased and introduced the multicultural cropping pattern as well as increased the demand of agricultural labor on the study area. All the agro- production is produced through the indigenous manual labor system, in which it mostly includes labor system- use of own family members, Parma system and wage labor. The demand of agricultural wage labor fulfilled in the study area is by the lower level or lower size of land holding people of same area.

After the construction of HIP not only cropping pattern have been changed but also there is a change in total production of major crops, food habits of farmers to some extent, while the mail food items were made from millet, maize and rice in the past. At present they take more rice, wheat and some vegetables. They use less and less maize and millet: instead, they use them as cattle-feeds

The over- all food situation of the command area is 34.68 percent households are in balance, 40.0 percent are in deficit and 26.32 percent are in surplus production. However the total production of the command area is sufficient to meet the total demand. In short, because of irrigation facility, irrigated area, cropping pattern, agro-production and socio-economic activities have been changed and increased in the command area of HIP.

The farmers of study area are also facing various types of general and serious problems in the whole agricultural system as well as cropping time in the farm land due to the lack of sufficient irrigation in the paddy and vegetable crops in summer and winter respectively. There is insufficient water in the main source and also lack of sufficient branch canals. Cattle dung is insufficient, farmers face lacking problem of improved manual as urea, nitrogen and improved seeds as well as not sufficient technological support. Farmers buy hen dung from other districts which is essential for the up season vegetable and cash crops.

7.2 Conclusions

Based on the above findings, it can be concluded that, after construction of HIP, irrigated area of Hemja VDC has been increased. Due to the increasing irrigation facility, the cropping pattern has also been changing. Farmers have adopted intensive agriculture and multicultural cropping system. Socio- economic condition of farmers has been highly influenced by the HIP in many ways, such as : It has brought change in cropping pattern which has promoted the agricultural production thereby raising their living standards. HIP has changed the way of social interaction and self dependency and the decision making power of the local people has also increased due to the implementation of HIP. The work load has increased and people are more busy today. Basically,the status of women is not changed considerabley. it is

still mail dominant and they are more busy than man. But due to the education, access in income women empowerment is slowly in positive direction. Their involvement in politics, different committee and decision making activities is increasing. Social evil like witches, untouchable etc is being weakened though it is still in existence.

7.3 Recommendations

Based on the above mentioned conclusion and researcher's field experience, following recommendation have been made in order to develop the agricultural sector in the command area and further improvement of HIP .

- The DIO should take appropriate step toward reducing the oozing through the Head-work walls and should do repair and maintenance of the whole irrigation system.
- For applying new technology and methods to the crops production there should be sufficient facility of J.T and J.T.A (i.e. Agri sub-center must be upgraded and equipped)
- The District Irrigation office should provide technical assistance, technical knowledge and sufficient budget for preparing water distribution schedules and maintenance of the system.
- The command area rapidly changing towards commercial agricultural system, it is necessary to establish a sound, mutual relationship among the user of HIP and other government, semi-government as well as private and non governmental organization in that area.
- It is necessary to formulate an effective programme to increase the water in the main source.
- There is not enough water for the winter crops and cash crops. Due to the lack of sufficient water supply farmers do not get sufficient production. Therefore, in the winter season, the water should be distributed properly considering the area covered by the cultivated crops.
- The distribution of agro-inputs should be carried out in proper seasons and in sufficient quantity.
- Sufficient outlets and sub- branch should be constructed according to the needs of the farmers' and unlined branch canals should be lined.
- The study area is situated as the sub- urban area, so that cash crop farming(i.e. up seasonal vegetables) should be encouraged in that area.
- A cold store should be established immediately in the command area.

- The leading farmers and members of WUA of the area should sent for national and international training , orientation and field visit to share the experience, broadened the horizon, apply best practices , inspire in organic farming and aware in pesticides using .
- An well equipped agriculture research center should be established in Hemja VDC.

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APPENDIX I

The socio-ecomonic impact study of Hemja Irrigation Project

INDIVIDUAL QUESTIONAIRE

1. Name of Head of the Household.:
   Name of the Respondents:
   Address:
   Caste/Religion:
   Date of Interview:
   Background of Family Members:

S.N.	Name	Relation of HH	Age	Sex	Education	Occupation
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

2.Economic Background

a) What is your land Tenure Status ?

i) Own cultivates ii) Tenure Cultivates
iii)Share Cropper iv) Landless

b)Do you have own Cultivated Land?

i)Yes ii) No

c) If Yes, How much do you have?

.....Ropani

d)What was your total average income at last year ?

Rs……

e)How long it was sufficient for your family ?

i)Up to 3 months ii)3 to 6 months

iii)6to9 months iv)9to12months

v)Sufficient with Surplus

3.How much cultivated land did you have before 1986 and In last year 2010

	Before 1986	At 2010
Irrigated		
Non irrigated		

4.What were the methods or sources of Irrigation in your land before HIP?

……..

4.1 Was the Source or method sufficient?

i) Yes ii) No

5.Which type of crops did you plant before HIP and at present?

Before HIP1986	Last year 2010
Summer crops Winter crops	Summer crops Winter crops

6. What was the agro-production in the year 1986 and in the last year 2010

3	Before HIP 1986			Last year 2010		
Crops	Area	Production	Yield	Area	Production	Yield
Paddy						

Wheat						
Maize						
Millet						
Oil-Seeds						
Vegetables						

7.What type of Agricultural inputs, did you use in last year?

i)	Seeds	Local	Improved	Both
ii)	Tools	Traditional	Modern	Both
iii)	Fertilizer	Compost	Chemical	Both
iv	Insecticides	Yes	No	

8. How did you manage necessary labour for farm operation last Year?

i) Use of wage labour only
ii)Use of own family members only
iii)Use of own family members and Parma
iv)Use of own family members and wage labours
v)Use of own family members, wage labours and parma

9. How long did your cereals last for your family from own products?

	Upto3 months	3-6months	6-9months	9-12months	surplu
Before HIP-1986					
After HIP 2010					

10. What is the land Value before and after the HIP?

Before HIP	After HIP
Rs.	Rs.

11.Food Habit

Before HIP	After HIP
i)	i)
ii)	ii)

12. Excluding irrigation, have you used the canal water for other purposes?

A, Bathing ans washing cloth Yes/No

B. Drinking Yes/No

C. Cattle Yes/No

D. Others-(specify) Yes/No

13.Is there any impact on your work load after construction of HIP?

i) Yes ii) NO

14 If Yes what types of Impact do you feel?

i).....

ii).....

15.Do you feel any changes in the social situation after implementation of HIP?

i) Yes ii) NO

16. If Yes what types of changes do you feel?

i)..... ii).....

17. In your experience what are the major problems related to HIP?

i).....

ii).....

18. Would you like to give any comment and suggestion for the further improvement and smooth development of HIP.

a. Comments b. Suggestions

i)..... i).....

ii)..... ii).....

APPENDIX II
Questionnaire related to the Officials of HIP

Name of the Respondent:.....
Office/Post.....

1. When was the construction of the project started and completed?
   Date of start:.....
   Date of completion:.....

2. What are the objectives of this project? Which have been fulfilled and have not yet achieved?
   .....
3. Description of canals:
   Length:..... Discharge capacity:.....
   Command area ..... No of main and branch canal.....

4. How much was the total construction cost of this project?
   .....
5. What type of irrigation management system is followed?
   .....

6. In which months and what types of crops are provided by the irrigation facility throughout the year?
   .....
7. Is there any programme for its extension, development and improvement ?
   .....
8. In what different ways the cost of operation and maintenance is shared by the beneficiaries?
   .....
9. Is there any provision for recording the problems related with farmers and the project office?
   .....
10. Other comments and suggestions(If any).
    .....

APPENDIX III
VDC Level key informant Checklist

Name of Respondent:

Designation:

Date:

What type of agricultural equipments and inputs are used in this area ?

List the wage rate of agricultural labors:

Male labour	Rs./Day
Female labour Rs./Day	Rs./Day
Childs labour:	
Boy	Rs./Day
Girls:	Rs./Day

Are the farmers benefitted by this irrigation project?
Explain:

HIP Head Works

Main and Branch Canal

Rice field

Vegetable Farming/Nursury

Cow farm

Urbanization- Milanchowk