

CHAPTER – ONE

INTRODUCTION

1.1 Background of the Study

Nepal is predominantly an agricultural country where more than 81 percent of their populations are engaged in agriculture. Agriculture is the “Backbone of Nepalese economy” due to contribution to the Gross Domestic Products (GDP). Being the backbone of the economy, this sector has still direct impact of favorable and adverse monsoon situation. The role of this sector has been the source of food and raw material for export and industries. In Nepal, monsoon wind normally enters from the eastern part during the second week of June and then spreads throughout the kingdom within a few days. Monsoon wind causes maximum rainfall during mid – June to mid – August. The intensity of monsoon generally becomes weak with low rainfall after the third week of September.

If we concern about the increase in agricultural productivity, we must think about the use of modern technology fertilizer, pesticides, improved equipment and seeds, credit facilities but co- operated with irrigation facilities. Mostly by using those necessities, improvement in the food demand but also supports the most important agriculture based industries of Nepal. Besides other factors, the cultivable land not supplied with adequate irrigation facilities, can produce crops in summer and monsoon season only. In winter season, due to the lack of rainfall, crop production is less

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.

There is close relations 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.

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 Pangen 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 Baeda, 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 2

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 tons / hectars. 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 have 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.

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.

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 Rani Jamara Kulariya Irrigation Project (RJKIP) 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.

- a. What types of socio-economic changes are appeared with the implementation of RJKIP?
- b. Who are the people to be benefited by the RJKIP?
- c. What are the problems faced by the farmers under this irrigation project?

1.3 Objectives of the Study

The general objectives of this study are to analyze the socio-economic impact of Rani Jamara Kulariya Irrigation Project (RJKIP). The specific objectives of this study are as follows:

- a. To analyze the land use pattern in the study area.
- b. To examine the change in socio-economic impact, due to the irrigation project.
- c. To analyze the problems and prospects of the project.

1.4 Importance of the Study

Irrigation is one of the important factors for the increased agricultural yield. However, irrigation facility alone can't increase production to the extent usually observed in well managed productive agricultural environment. Selection of crops and varieties, use of fertilizers, proper planting with respects to time, seeding age and density of crops are also among the few components for higher yield. This study will help to determine how much each of these inputs including irrigation has contributed to the final yield. It will also help suggest possible ways for further yield increase in the command area.

As this study aims explore the socio economic impact of irrigation project in study area, this will be helpful to understand the status and trend of agricultural activities in study area.

Some other importance's such as It could be helpful to understand socio-economic and cultural change on farmers by this kind of project. Helps to identify the problems related to irrigation system, Provide useful information to the government sector, policy makers, users group, management committee, and other irrigation projects, Provide essential pre information for future plans and program as well as solving the problems in order to improve the project performance and Helps to further researchers.

Limitation of study

1.5 Organization of the study

This thesis is organization in to five chapters the first chapter deals with the introduction. It includes the background of the study are ,statement of the problem ,objective of the study ,significant of the study area, important of the study area ,organization of the study area .The second chapter present literature review .The third chapter present research methodology .it includes the research design, relational of the selection of the study area ,sampling producer ,source of data collocation ,data collocation ,data collocation tools and technique ,house hold ,field visit and observation ,key informant interview ,focus group discussion and data analysis. The forth chapter present of data present and analysis with profile of the study area .The five chapter present the

socioeconomic impact of the study area . And the last chapter presents the summary and conclusion. Appendix and reference have been kept at the end of the report.

1.6 Limitation of the Study

This study has mainly concerned with one of the VDC of the Kailali District. So this study may not represent the problems of the district or country as a whole. This study has concerned only Ranijamara kulariya irrigation project on agriculture production. And it has also observed social condition, economical conditions, and affordability of cost in micro level conducted within a limited time and based on primary data.

In the study area the total household is 3652; out of which 60 household are surveyed because only 2200 household in ward no.-4 and 2 directly benefited by this project. So, this study limits ward no-2 and 4 of Pathariya VDC.

- a. This present study is based on and limited to the people of Pathariya VDC.
- b. This is completely an academic work.
- c. The study is fully dependent upon the field visit inspection as well as interviews, data and response of local people of the study area.
- d. The study is very specific like that of case studies. So, the conclusion drawn from the study might not be conclusive.

CHAPTER - TWO

REVIEW OF THE LITERATURE

Literature review is the most important component of the research from which the researcher gains the other's experiences from previous study. Also, it helps to gain insights on a particular research problems and acknowledging the previous efforts made by the scholars and researchers. It can be a strong bridge between the previous and the present efforts to carry out the fundamental assumptions without which a research work never can be original. For this research work, the literature review will be done under two categories, the conceptual review and review of empirical study.

For this research work different books, journals, previous research works, reports, acts, articles, plans and policies, other published and unpublished documents related to the subject will be reviewed. However, some of the literatures have been reviewed.

2.1 International Context

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.

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 Britannica, 1943-1973).

Grist (1975) has reported that irrigation implies not only an adequate and controlled water supply, but also sufficient drainage of excess water whenever desirable. Similarly, Garg (1981) defines irrigation as the science of artificial application of water to the land, in accordance with the crop requirements through the crop period for full-fledged nourishment of the crops. Thus, we can sum up that any artificial device to supply of

water to the cultivated land is irrigation. Therefore, irrigation is mainly a device to supply the necessary amount of water required to the plants of cultivated land.

Pandey (1978) has studied about the impact of irrigation on rural water development to distinguish between irrigated and non – irrigated area. In order to meet the objectives he collected primary information through the field survey by using questionnaire. He states that small size land holding families are higher in the irrigated area rather than non – irrigated area. In the irrigated area, different varieties of crops are cultivated where employment, literacy and income are higher than that of non – irrigated area. The use of fertilizer is going to increase whereas the use of traditional manure has been declining. There is a great variation in the use of fertilizer due to several factors such as high price, lack of knowledge etc. It shows that the chemical fertilizers have not been used in large quantity, although crop production is higher due to the availability of irrigation facility.

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.

Hazelwood and Laving 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.

2.2 National Context

In the context of Nepal, Mallick (1981) has asserted that the history of irrigation at least in Kathmandu Valley is as old as its adjacent land (Gangatic Valley and Pamir). Mallick adds that rice was cultivated since 2800 BC, which mentioned in ‘Veda’ was written in 1500 BC, which proves that Nepal has a long history of irrigation practices.

Attempts for increasing irrigation facilities in Nepal date back to quite a long time. In the past, Raj Kulo (indigenous traditional system) was famous around the capital city and was operated by government subsidy to irrigate the land. King Shaved had built a dam at

BalkhuKhola 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).

Shrestha (1988) Kathmandu valley and its periphery were irrigated during Malladynasty. By the middle of the 12th century, king Shivdev had built a dam at BalkhuKhola near Kirtipur for irrigation. Several other Rajkulos were constructed during Malla regime. Naikes were appointed for regulation, governing, maintenance and operation of Rajkulos.

Poudel (1985) in the process of food grain farming water is one of the most essential elements for a plant. 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 farming through different ways, natural and artificial water is normally supplied to the plants by nature through the agency of rain or precipitation which includes natural supply of water and artificial supply of water in a cultivated land. This process is known as irrigation.

2.3 Impact of Irrigation

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-economic 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.

APROSC (1979) has made an evaluation study of Mahakali Irrigation Project and mentioned that productivity of paddy and wheat in irrigated is higher than in non – irrigated land. Also mentioned, farmers pay more attention to irrigated land, which has higher productivity than non – irrigated ones and per family income has found to be higher in that area and also both farm and family expenditure remained higher in project area.

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, there 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 report notes that there is a positive correlation between local participation and improved agriculture in the project area.

Similarly, the report of Sunsari-Morang Irrigation Project of APROSC (1987) has summarized that the proportion of cultivated area under late paddy and the cultivated land under multiple cropping in the command area have increased. Further, the uses 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.

Acharya (2000) has studied the impact of Chapakot Tar Irrigation Project on Paddy Production in Ratanpur VDC, Syangja. He concluded that land productivity increased significantly due to irrigation facility. He also found out that productivity is affected by water distribution land ownership (own or rented), family size and farming community.

Khanal (2000) has studied the impact of Rainstar Irrigation Project on Paddy Production in Chakratirtha VDC, Lamjung. He has concluded that irrigation facility has helped to increase paddy production and paddy cultivation area. It was also found out that income generation and output of the farmers underwent a rapid change after the irrigation. Due to the irrigation project, the socio – economic condition of the study area changed for better.

Lamsal (1990) has studied the impact of Handetar Irrigation Project and concludes that after the augmentation of irrigation facilities, the proportion of total irrigated land and its scale of production have been increased. He also pointed out that due to the increased irrigation facilities, the cropping pattern also has been changing and people have adopted intensive agriculture and multiple cropping system.

Bhandari (1996) has studied the Impact of Kandai Irrigation Project on Paddy Production and concluded that the production of paddy has increased with 79 percent, whereas the cultivable land has increased 43.5 percent. He also mentioned that the living standard of people in this area has increased after the construction of irrigation project.

Literature review is the most important component of the research from which the researcher gains the other's experiences from previous study. Also, it helps to gain insights on a particular research problems and acknowledging the previous efforts made by the scholars and researchers. It can be a strong bridge between the previous and the present efforts to carry out the fundamental assumptions without which a research work never can be original.

The role of irrigation in increasing agricultural production is well recognized and several irrigation systems have been established all over the world. In the field of irrigation farming on agriculture, most of the research works have been carried out in India, China, England, USA and other Asian and European countries. But in context of Nepal, only few research works have been done. In this chapter, irrigation related various literatures are available. These literatures have been broadly categorized into two types:

- (A) Theoretical Frame work
- (B) Empirical Frame work

(A) Theoretical Frame work

The Now Encyclopedia (1973),The Egyptians used water from the Nile to irrigate adjacent fields as early as 5,000 B. C. Historical records indicate that early civilization developed along river that supposed irrigation water to the fields. Historical records also so that King Menes (who lived around 3,100 B. C.) had a large masonry dam built to control the Nile River and provided water for irrigation.

FAO (1992) has made one report about mechanization of irrigation as an crop production. The study concluded that agriculture and irrigation have worldwide importance how days, Agriculture and irrigation are the complimentary factors. Especially, the rate of population is increased where food supply and demand are not in balance. This states that irrigation project is generally utilizing the water in certain parts, which helps to increases the crop production. Farmers are benefited by their agricultural production and food supply can be balanced to maintain increasing population. It also emphasized the without proper irrigation facility the cash crops can't grown in high amount and the income of farmers also can't be increased in equal ratio.

World Bank (1996) has studied the agro – economic impact of irrigation in South East Asia. It has revealed only three countries for detailed study. They are Thailand, Myanmar and Vietnam. The information was collected that standard, per capita income and other indicators of civilization of people are more satisfactory in the irrigated area than in non – irrigated areas. Farmers also hesitated to invest on fertilizer and other inputs in non – irrigated area and they have not found proper agricultural production. Due to low production of agriculture, Vietnam has faced several problems such as food deficiency, starvation, hunger and malnutrition etc.

UN (1991) has reported the development of irrigation and production area of Nepal. This study concluded that irrigation development was started in the past and continued, mostly in terai then in hilly region proper by topographic constraints. This report emphasized that without proper irrigation facility the production area may not be improved. The farmer knowledge about insecticide and pesticides is also an important factor to develop the agriculture production.

Grist (1975) has reported that irrigation implies not only an adequate and controlled water supply, but also sufficient drainage of excess water whenever desirable. Similarly, Garg (1981) defines irrigation as the science of artificial application of water to the land, in accordance with the crop requirements through the crop period for full fledged nourishment of the crops. Thus, we can sum up that any artificial device to supply of water to the cultivated land is irrigation. Therefore, irrigation is mainly a device to supply the necessary amount of water required to the plants of cultivated land.

Jha (1994) evaluated the Tribeni Canal in India. The productivity of irrigated land was compared with that of non- irrigated land. He concluded that one of the important effects of irrigation was different types of crop pattern has been found in irrigated area than that of the non – irrigated area. His survey result revealed that irrigated area to a great extent grew paddy and less sugarcane.

Pandey (1978) has studied about the impact of irrigation on rural water development to distinguish between irrigated and non – irrigated area. In order to meet the objectives he collected primary information through the field survey by using questionnaire. He states that small size land holding families are higher in the irrigated area rather than non – irrigated area. In the irrigated area, different varieties of crops are cultivated where

employment, literacy and income are higher than that of non – irrigated area. The use of fertilizer is going to increase where as the use of traditional manure has been declining. There is a great variation in the use of fertilizer due to several factors such as high price, lack of knowledge etc. It shows that the chemical fertilizers have not been used in large quantity, although crop production is higher due to the availability of irrigation facility.

Kumar (1997) has made a study on the topic “Economics of Water Management” in the Orissa’s Sambalpur district of India and summarized that the application of manure and fertilizers, the project measures was higher. The higher yield per acreage of both high yielding varieties and local varieties of paddy was found in the village with field channels in both kharif and rabi seasons. This in turn resulted in high gross return higher than that form business and family labour income and net income in the improved village.

Kannaiyan (1995) has described that there are two types of paddy, early paddy and main seasonal paddy. Early paddy matures in between 100-200 days. This usually is harvested in June – July. Early paddy is transplanted mainly in irrigated land. The second main seasonal paddy is planted after the break of monsoon in June – July and transplanted in July – August and harvested in October – November.

According to Pant and Jain (1979) in their book “Agriculture Development in Nepal” bad distribution of land ownership, sub – division holding and lack of efficient rental cultivators in making greater efforts for increasing agricultural production. The rise in agricultural production is directly affected by the use of various inputs and irrigation facilities. According to them, to achieve the rapid growth in agricultural sector, not only modern agricultural technique should be made available to farmers but the necessary pre condition for their wider adoption i.e. infrastructure has also to be developed simultaneously.

(B) Empirical Frame work/ National Context

In the context of Nepal, Mallick (1981) has asserted that the history of irrigation at least in Kathmandu Valley is as old as its adjacent land (Gangatic Valley and Pamir). Mallick adds that rice was cultivated since 2800 BC, which mentioned in ‘Veda’ was written in 1500 BC, which proves that Nepal has a long history of irrigation practices.

Our recorded history shows that in Lichhivi era, there was a good deal of provision for agriculture. Feudal lord Amshuverma, Jishnu Gupta etc had contributed a lot to improve agriculture. They had made a number of Rajkulos (indigenous traditional canals) to irrigate the arable land (CDC, 1976)

Poudel (1985) in the process of food grain farming water is one of the most essential elements for a plant. 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 farming through different ways, natural and artificial water is normally supplied to the plants by nature through the agency of rain or precipitation which includes natural supply of water and artificial supply of water in a cultivated land. This process is known as irrigation.

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Pagni (1986) has studied the impact of Chitwan Irrigation Project on agricultural production with reference to Narayanpur VDC. He has used random sampling technique and primary data, which was collected through sample survey. Both quantitative and qualitative methods were used for analysis. He has concluded that, in the study area before Chitwan Irrigation Project was developed paddy cultivation depended upon monsoon rainfall and covered only 25 percent of total land irrigation. After project was developed paddy cultivated area was increased to 55 percent of the total land. The paddy yield has also been raised to 19 quintal per bigha.

Dahal (1991) has studied to know the impact of Rampur Irrigation Project such as an cropping pattern, cropping intensity and crop yield in Chitwan district. He has used that random sampling technique to collect data and concluded that there is significant change before and after irrigation on crop pattern. In the study area before irrigation project about 62 percent of the cultivated area districts. All these conditions have changed after the availability of irrigation facility people were able to produce more crops in two

seasons. Their annual income and social status have highly developed due to the increase of agricultural production.

Dhakal (1990) has studied the Socio- economic Impact of Kamala Irrigation Barmajhiya VDC in Dhanusha district. He has used primary sources to fulfill his objectives. He has concluded that people of Barmajhiya village are not satisfied by was irrigated mostly in monsoon season. The cropping intensity was high and most of the cultivated land was covered by Mono- culture cropping pattern, crop yield was low and also the cropping pattern was of self sufficient type. After the availability of irrigation facility 82 percent of the cultivated land had been irrigated.

APROSC (1987) has studied the impact on Sunsari – Morang Irrigation Project on crop production using primary and secondary data sources. APROSC has concluded that after the availability of irrigation facility, multiple crop patterns in the study areas have increased. Further, cropping intensity and productivity also increased but labour use intensity has not been increased at the same rate. Finally, the study also notes that the gross income from crop production has been increased by 80 percent of baseline study.

APROSC (1978) has made study on the topic of manusmara Irrigation Project and concluded that productivity increased by 79 percent and cropping intensity increased only by 21 percent relatively higher magnitude in the case of medium farmer due to irrigation facility.

APROSC (1978) has made another study of Gajuri Irrigation Project and explained that the cropping intensity in the irrigated khet land was 16 percent higher than in the non-irrigated khet land. It has also mentioned that increase in productivity of paddy crop exceeds the target by 0.04 muri/ropani but that of wheat crop is below target by 0.55 muri/ropani.

APROSC (1979) has made an evaluation study of Mahakali Irrigation Project and mentioned that productivity of paddy and wheat in irrigated is higher than in non – irrigated land. Also mentioned, farmers pay more attention to irrigated land, which has higher productivity than non – irrigated ones and per family income has found to be higher in that area and also both farm and family expenditure remained higher in project area.

Upreti(1989) has also made a similar study on the topic of impact study of Kankai Irrigation Project on Paddy Production. He has summarized in his report that the rate of paddy production has increased with the increase of irrigation facility and that irrigation bring the higher intensity in the cropping pattern. He has concluded that there is positive relationship between irrigation and paddy production.

Karki (1997) has also made a study on the topic of the impact study of Hemaja Irrigation Project in Kaski district. He was summarized in his report that due to the irrigation facility crop production, cropping pattern, and socio – economic condition of farmer in command area, have increased. But due to the lack of sufficient irrigation the paddy and vegetables in most monsoon periods, farmers remain deprived to get optimum benefit from their land and labor.

Dhakal (2000) has estimated a paddy production function in Singiya VDC of Sunsari District. His conclusion is that chemical fertilizer is positive but insignificant. Its elasticity is Negative which means there is an increase relationship between chemical fertilizer and output due to the improper use of chemical fertilizer.

Acharya (2000) has studied the impact of Chapakot Tar Irrigation Project on Paddy Production in Ratanpur VDC, Syangja. He concluded that land productivity increased significantly due to irrigation facility. He also found out that productivity is affected by water distribution land ownership (own or rented), family size and farming community.

Khanal (2000) has studied the impact of Rainstar Irrigation Project on Paddy Production in chakratirtha VDC, Lamjung. He has concluded that irrigation facility has helped to increase paddy production and paddy cultivation area. It was also found out that income generation and output of the farmers underwent a rapid change after the irrigation. Due to the irrigation project, the socio – economic condition of the study area changed for better.

Lamsal (1990) has studied the impact of Handetar Irrigation Project and concludes that after the augmentation of irrigation facilities, the proportion of total irrigated land and its scale of production have been increased. He also pointed out that due to the increased irrigation facilities, the cropping pattern also has been changing and people have adopted intensive agriculture and multiple cropping system.

Bhandari (1996) has studied the Impact of Kandai Irrigation Project on Paddy Production and concluded that the production of paddy has increased with 79 percent, where as the

cultivable land has increased 43.5 percent. He also mentioned that the living standard of people in this area has increased after the construction of irrigation project.

Baidya (1965) has described that the irrigation is an important factor which was started in ancient time and has been continued till now. He also stated that there has been positive relationship between irrigation and crop production. And scientific irrigation can't be developed without the skill manpower, modern technology, modern equipment and capital.

Khatri (2001) has described the process of utilization of this water involves the construction of engineering works of applicable magnitude, it would be called artificial irrigation and we can 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.

Located in Ilam Municipality-5, Ilam district, Geya Danda Irrigation System is farmer's managed irrigation system which irrigates 125 hectares (ha). The main benefiting farm area is Puwajung. The source of water from the irrigation project is Puwa khola (river), a prominent spring fed perennial stream of the district. The rivers confluences with the Mai khola, immediately below the project area. The water shed of Puwa khola is a part of Kankai mai basin. The availability of vegetations includes both tropical and sub tropical. The total catchments area of Puwa khola of the head work site is about 10 kilometers (km) which has its elevation from 150-2100 meters above sea level spread over the Mahabharata range (EIA, 1995).

The total number of household in the project area is 88 and total population is 572. The average family size is 6.5; the cast composition of the area is Chhetris (38%); Tamang (19%); Rai/Limbu (12%); Brahmins (12%) and Sarkis (7%) households (hh) (CBS, 2000). Land has been divided into two types; bari (dry cultivated land), and khet (irrigated land). People plant different types of crops all the seasons of the year, where irrigation is available. Maize and ginger are planted where water is not available. All farmers cultivate ginger as main cash crops and sell in local market, which is equivalent to 10 million Nepalese rupees per years (Key informants). Paddy is planted on two seasons, mainly in April and in June/July. Oil seed, potato, wheat are planted for only domestic uses not for sale.

Before the project implementation and road construction of Ilam to Jhapa, people use to practice the use of organic fertilizer but now farmers are using maximum chemical fertilizers for different crops. Local people reported that they used more than five times for some field for different crops per year. The land size is decreasing but the family size, population and cost is increasing. All the farmers in the project area cannot understand how much fertilizer to use for crops. Now farmer have felt need of training to use fertilizer and pesticide. Construction of irrigation system and Mechi highway is the main cause of increasing population in this area. The land is very fertile and market is also available, so many people from other area have immigrated for two purposes i.e. agriculture and business of local production. Now 25% of farmers are involved in both agriculture and business. Other sources of incomes are: livestock (in big size only by pure farmers and small by businessmen). Landowners vary in terms of land holding size; 3 hh (land less), 12 (tenants), 28 (less than 1 ha), 37 (1-2 ha), 20 (2-5ha) and 2 (more than 5 ha) (Kattel, 2003: 35).

Farmer's rules and regulation mostly concern with the water distribution. In general water distribution means the provision and methods of how the available volume of water is used within a specified farm. Here the rules for water distribution include the general norms applied to water acquisition, allocation, and application. Water distribution rules depend upon the availability of water, types of soil, location of land service area (Poudel, 2000: 120). Rules are applied more strictly during the water scarcity period. There are different rotation schedules depending on the availability of water in the source. If water is plenty in study area, farmer practice following principle.

Geya danda farmers clean the irrigation canals at least two times each year after transplanting their rice. The WUA decides the date and calls the general assembly. The Panipale delivers the notice of the general assembly meeting to all members for the proposed meeting. The WUA requests that all members attend the event themselves or to send working aged male member if possible. If member is absent or not able to attend, another working age member from his or her household may represent him or her. If possible, the representation should be male member. According to the WUA rule, there is the provisions of fine against the member who are absent from the canal clearing or emergency maintenance. Generally one day absentees are subject to a monetary fine

equivalent to one day's paid labor. The fine is three times more who attend general assembly meeting but does not come as promised. In this time users and WUA conflict arise.

Uphuff (1986:29) defines 'water acquisition as the process of acquiring water from the surface or sub-surface or by creating and operating physical structure like dam, wells, or by action to obtain shares of an existing supply'. Geya danda farmer have to make a temporary diversion structure to use stone, grass, soil etc for the purpose of capturing the available water during the dry season. They have to capture all the available water to irrigate the farm land during the dry season. The temporary diversion structure should be washed away in rainy season. So they spend much time for construction activities of intake. Water acquisition activities are extremely difficult work in dry season than in monsoon. They have appointed a panipale to handle the water rotation within the service area. However, the water rotation was followed only if water was insufficient for regular supply in the rice field. Whether water is enough for the continuous irrigation to all lands is simultaneously watched by the panipale. In water scarcity period palo (rotation) system divides the total service area from head to tail for four days and again from head to tail. The general assembly provides all authority to handle the water rotation or apply palo system necessary. Any individual, concerned user of the kulo who alter the volume of water flowed by the panipale is regarded as water thieves and are punishable by the WUA; first time (Rs 100), second tiem (Rs500) and third time and so on continue stop the water for fifteen days in his field Sustainable development was famously defined by the World Commission on Environment and Development (WCED) as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987), but many authors have since developed their own definitions and adopted varying stances on 'sustainability'. Attempts have been made to classify these notions, resulting in concepts of weak versus strong, light green versus dark green and techno/anthropocentric versus eco-centric, with the former in each case taking the view that natural capital may be replaced with human-made capital, whereas the latter deems natural and human-made capital as incompatible (Haughton and Hunter 1994). Within this range of definitions and approaches, there are common themes that can be combined to provide some 'principles' for sustainable development, based on the underlying notion that future generations should be compensated for reductions in the endowment of resources brought about by the actions of present generations (Pearce *et*

al., 1989). Haughton and Hunter (1994) argue that these concepts of futurity, equity and environment must underpin the process of sustainable development, such that the principles of inter- and intra-generational equity and trans-frontier responsibility are at the forefront of sustainable development policy.

Increasingly, notions of sustainability are being linked to systems thinking (see Bell and Morse, 2003; Kelly and Baker, 2002; Bakkes, 1997) whereby sustainability is understood to be a framework for managing change. A system is a whole whose elements interact as they continually affect each other over time and operate towards a common purpose (after Senge *et al.*, 1994 in Kelly and Baker, 2002); thus systems thinking encourages thinking about cause and effect and inter-relationships between elements. Whilst this holistic approach to measuring sustainability is valuable, recognising that “*sustainability is not determined by single components*” (Ko, 2005: 436), systems theorists are still struggling to suggest a methodology for linking cause and effect in complex systems, to adequately analyse direct, indirect and flow-on effects of any one action and to deal with multiple, tiered temporal and spatial scales.

Sustainable Tourism in Agriculture

The multiple issues bound up in the sustainable development/ sustainability debate are inevitably transferred to the concept of sustainable tourism. Again, the lack of any universal definition has led to a multiplicity of tailor-made meanings and applications (Box 1). As with sustainable development, there is the freedom to adopt varying ‘shades of green’ in approaching sustainable tourism. From the light green approach that holds tourism development and tourist and operator satisfaction as the central aim to the darker green in which the precautionary principle and concept of carrying capacities feature highly (Hunter, 1997). The stance adopted has major implications as it will govern the approach to implementation and hence the outcome.

“Sustainable tourism development meets the needs of the present tourists and host regions while protecting and enhancing the opportunity for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled, while maintaining cultural integrity essential ecological processes, biological diversity and life support systems”

“Sustainable tourism is about managing tourism’s impacts on the environment, communities, and the future economy to make sure that the effects are positive rather than negative for the benefit of future generations. It is a management approach that is relevant to all types of tourism, regardless of whether it takes place in cities, towns, countryside or the coast.”

(English Tourism Council, 2002)

“Tourism which is in a form which can maintain its viability in an area for an infinite period of time.” (Butler, 1993: 29)

“Tourism that takes account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities.” (CNPA, 2005)

Eber (1992) provides a further useful synopsis:

“if tourism is to be truly beneficial to all concerned . . . and sustainable in the long-term, it must be ensured that resources are not over-consumed, that natural and human environments are protected, that tourism is integrated with other activities, that it provides real benefits to the local communities . . . that local people are involved and included in tourism planning and implementation, and that cultures and people are respected.”

Over the last decade, the lowland farms in these sites underwent a transformation from rainfed to irrigated conditions. This resulted in a shift from rice and corn production under rainfed conditions into mainly rice production under irrigated conditions. The Marangas Communal Irrigation System (CIS) started operating in early 1995 covering an irrigated area of about 500 hectares. The Tamlang CIS started in late 1998 covering almost 1,000 hectares of lowland rice plots. The dam-type irrigation systems in both sites were constructed by the Philippine National Irrigation

Administration (NIA) in cooperation with the irrigators’ associations organized by NIA to manage and maintain the irrigation facilities. Both Marangas and Tamlang CIS were part of a total of 24 small-scale irrigation projects built by NIA throughout the province. Most rice farms in these irrigated areas were owned and/or operated by migrant rice farmers from other farming areas in the country. The adjacent upland communities mainly consist of households belonging to the Pala’wan tribe who formerly occupied exclusively the alluvial plains or lowlands until the late 1940s (Brown, 1996). With the influx of more wealthy migrant farmers in the lowlands in the 1940s, these tribesmen sold

(or were dispossessed of) most of their flat lands and migrated into the forested hillsides. Replicating their previous lowland social structure, these tribesmen formed several small villages (or hamlets) in the uplands headed by a panglima or tribal leader. A number of these villages comprise the upland communities of this study. During the time of the survey, the upland households in these villages actively interacted with the lowland communities through a number of social and economic events which include tabular (a small weekly market) and tamper (a traditional cockfighting event). However, the economic activity that is the major focus of this study is the upland households' off-farm employment on lowland farms.

In 1997, one of the two lowland study sites, Maringa's, had a fully operational irrigation facility providing irrigation access to about half of the total households in the lowland sample. In terms of income and rice yields, 1997 is classified as a favorable year in the lowlands. During this year, the lowlands experienced favorable climatic conditions for rice growing with a low incidence of pest and diseases. These conditions resulted in high crop yields and almost no crop failure, and greatly contributed to the attainment of the highest income per capita for the observed lowland sample (see Figure 2.2). Figure 2.2 shows that, in the uplands, 1997 can be classified as an average year: income per capita during this year is higher than in 2002 but lower than 1999. The cropping year 1998/1999 was the first in which the irrigation facilities in both lowland sites operated at full capacity. However, despite this condition, an El Niño induced period of prolonged drought occurred during the latter part of 1998. This resulted in unfavorable growing conditions. Low crop yields and/or crop failures resulted in negative incomes for many lowland rice farmers. During this cropping year, according to several farmers, residents experienced a high incidence of pests and diseases. These unfavorable conditions did not seem to affect agricultural production in the rained uplands. In fact, this year favored upland communities and allowed them to achieve the highest average income per capita among the four observed years. Given the highlighted conditions, 1999 can be considered an unfavorable year in the lowlands and a favorable year in the uplands. In terms of average income per capita, 2002 can be considered an average year in the lowlands and an unfavorable year in the uplands.

1995 declining to 80%, 70%, and 67% in 1997, 1999 and 2002). This might indicate that, although not abrupt, farm mechanization has slowly been taking over the land preparation activities. Although caribou remained widely used in doing the primary plowing of rice

plots, secondary plowing, cultivation and leveling were being gradually replaced by mechanized labor. In terms of farm size, workers per household and household size, no clear patterns emerge in the lowland panel. There were three major variable inputs used in rice production in the study sites:

labor, pesticides and fertilizer. A summary of hired labor from the parcel level panel data shows that, with the onset of irrigation development, the average number of hired workers per cropping per hectare doubled from 18 workdays in 1995 to 43, 40 and 60 workdays in 1997, 1999 and 2002, respectively (Table 2.5). The cost of pesticides per cropping per hectare increased several fold from P170 in 1995 to P1,266, P1,542 and P1,259. This steep rise reflects the limited types and amounts of pesticides used on rainfed plots (i.e., usually only insecticides). On irrigated rice plots, different kinds and greater amounts of pesticides are applied because new kinds of pest controls must be administered when new kinds of pests arise (e.g., golden apple snails and broadleaf weeds). For this reason, herbicides, molluskicides and rodenticides were added to the portfolio of pesticides used on lowland farms. With regards to the amount of fertilizer use, amounts of fertilizer applied per cropping per hectare decreased in the post irrigation years. This can be attributed to the lower fertilizer use efficiency of one-crop rainfed corn compared to irrigated rice. The amount of fertilizer applied decreased from 234 kg per hectare in 1995 to 168, 169 and 140 kg in 1997, 1999 and 2002, respectively.

CHAPTER – THREE

RESEARCH METHODOLOGY

3.1 Research Design

An analytical as well as descriptive nature research design had been used in this study. Research design was applied for the measurable factors of the sample households. These include land ownership, land use etc. Descriptive research design was applied for social condition of the sample households. The collected in format and data are subjected for analysis and descriptor.

3.2 Rationale of Selection of the Study Area

I have chosen Pathariya VDC as my study area, because this VDC is directly affected by RanijamaraKulariya Irrigation Project and most of the household of this VDC are involved in agriculture as their main occupation. Another reason is that, researcher who is conducting this study is also a dweller of same VDC and, he is among those people who get benefitted or affected by RanijamaraKulariya Irrigation Project.

3.3 Nature and source of the data

This study is conducted in order to explore the socio-economic impact irrigation project in Pathariya VDC, so for this study different data are collected. Basically primary data is collected from the households of the study area, whereas secondary data is collected from published and non-published written documents from individuals, experts, and organization related to the irrigation and agricultural sector. Where-as data collected is both in qualitative and quantitative nature as needed. Qualitative data like photos, observation and interview are collected and Quantitative data like employment related data, social status related data etc. is also collected,

3.4 Universe, sample and Sampling Procedure

Rani, Jamara, and Kulariya Irrigation Scheme (RJKIS) is one of the largest farmer-based irrigation system in the Tarai. Located in the Kailali District, it has a net cultivable area of approximately 14,300 ha of which about 11,000 ha are currently irrigated. The system is a cluster of three independent ‘kulos’ or branch canal systems, each with its separate water

intake from a bi-channel of the main Karnali river. According to focus group interviews and discussions with key informants, Rani Kulo was built by farmers in 1896, Jamara in 1960 and Kulariya 1972. At present, Rani has 18 branches, Kulariya 17 and Jamara 153 . Each Kulo has innumerable and an increasing number of branches and sub-branches to irrigate the command area. The three systems are owned, managed and operated by farmer communities with little input from government and external organizations. There exist close ties between the three kulo systems. All share a common source (located at some 120 meter south of Chisapani along the East West Highway) and users are required to annually contribute to source operation and maintenance. This project commands 8 VDCs and one municipality of kailali district. It is extended from Baliya in north to Dhansingpur in south .The geographical co –ordinate of the project .

For this study Universe is the people who engaged with RanijamaraKulariya Irrigation Project of Pathariya VDC, Kailali District. There are about 3652 household among them 2200 household are directly benefitted from the RJKIP. So, by the help of random sampling method choose two (2 and 4) wards in 60 household as sample to conduct this study.

3.5 Data collection Techniques and Tools

The structures questionnaire or unstructured interview and observation method is applied to generate the primary data.

3.5.1 Household Survey

Household survey was conducted by developing questionnaire as tool (see annex-I) the questionnaire mainly covered the socio-economic change among the beneficiaries before and after the irrigation project, 60 household was surveyed. To generate accurate and realistic data through household survey, structured questionnaire was prepared to be asked to fill up by local people, where as those respondents who are unable to fill up the questionnaire, the question is asked to the respondents and the answer is filled up to collect the required information.

3.5.2 Focus Group Discussion (FGD)

The focus group decoction is obtained through RJKIP management committee, VDC head; clubs, School, social group, selected farmer and other organized groups. There was number of 12 people discussion (see annex-II).

3.5.3 Key Informant Interview

Few peoples are selected as key informants including VDC, chairperson of water user association, local agriculture teacher, and local intellectuals. Key informants interview also adopted in this process. They are interviewed with the help of the key informant interview schedule (see annex-III).

3.5.4 Observation

The physical system and agronomic condition was directly observed 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 (see annex-IV).

3.6 Data Analysis

Data is analyzed with the help of Simple statistical tools like table, graphs are used for data. Descriptive methods used for qualitative data, completing the households or field survey, the qualitative data. Then qualitative data was compile and classified according to occupation, landholders and households of the study area. The next step had done according to manual processing. Manual processing involves several phase field editing, coding and data entry operation in the computer.

CHAPTER -FOUR

DATA ANALYSIS AND INTERPRETATION

In this chapter, the collected data is analyzed for fulfillment of objectives. The analysis is mainly based on questionnaires collected from local people, tourists (domestic and international), key informants, hotel owners and staffs, shopkeepers and intellectuals.

4.1 Profile of the irrigation project

Rani, Jamara, and Kulariya Irrigation Scheme (RJKIS) is one of the largest farmer-based irrigation system in the Tarai. Located in the Kailali District, it has a net cultivable area of approximately 14,300 ha of which about 11,000 ha are currently irrigated. The system is a cluster of three independent 'kulos' or branch canal systems, each with its separate water intake from a bi-channel of the main Karnali river. According to focus group interviews and discussions with key informants, Rani Kulo was built by farmers in 1896, Jamara in 1960 and Kulariya 1972. At present, Rani has 18 branches, Kulariya 17 and Jamara 153 . Each Kulo has innumerable and an increasing number of branches and sub-branches to irrigate the command area. The three systems are owned, managed and operated by farmer communities with little input from government and external organizations. There exist close ties between the three kulo systems. All share a common source (located at some 120 meter south of Chisapani along the East West Highway) and users are required to annually contribute to source operation and maintenance.

There are three Water Users Association in each Kulo and one apex committee (Federation) that links the three systems. The scheme has historically suffered from frequent wash-out of temporary diversion works, shift of river course at the head of the main diversion channel, erosion of canal banks, sediment deposition at the of the canals after every flood, and large fluctuations in the river course. A major shift of Karnali river cause towards eastern bank side away from the western intake side in the recent past have in turn caused the following problems: (1) difficulty in diverting water to the irrigation system during low river flow periods while uncontrolled flooding and sediment entering into the system during high river flow events; (2) inability to manage the water distribution equitably and efficiently; (3) poor road connections within and outside area

market that often become inaccessible from one place to other during monsoon season. Due to the lack of controlled and regulated flow of water, crop yields are low, and often times repeated sowings are necessary for the same crop. Consequently, the project aims to enhance agricultural production by improving performance of the irrigation system. This will be achieved through the following: (a) modernization of the RJK systems; (b) strengthening of the community-based water management; (c) providing support to agricultural development in the irrigated area; (d) encouraging crop diversification; and (f) facilitating market access.

The former will include a permanent intake structure about 120m downstream of the Karnali Bridge; a main conveyance canal; and a new head regulator and a branch canal which will be carried out by the DOI through its own resources. Those that are under consideration for a 40 million, first phase IDA include: (i) three head regulators and cross regulator set on the feeder canal, each for Rani, Jamara and Kulariya Kulos at their respective 2 Source: World bank (2010) Technical Report: Modernization of Rani-Jamara-Kulariya Irrigation Scheme Technical Report, Project Preparation Mission, June 14-23, 2010, Kathmandu. 3 Source: Department of Irrigation (2010) 'Tree Diagram of Rani, Jamara and Kulariya Irrigation Project', Kathmandu. 8 branch canals including a provision for temporary diversion arrangement with pipe culverts and gabions boxes river bank protection at the existing intakes; (ii) modifications, as necessary, for the three Main Kulos and related canal structure; and (iii) improvement of service road networks of about 40km within the three systems including bridges/culverts as necessary. The next two phases are also likely to include 48 sub-branch canals, and command area development for three kulo systems. The aim of this report is to present the findings of a social assessment that will complete the development of a socioeconomic profile of the project area, map out stakeholders in the project area; assess the underlying social, economic and political factors that play in the design and implementation of the project; and assess likely project impacts. On the basis of these assessments, the report also discusses the necessary interventions and mitigation action plan developed under the project and in line with relevant government and World Bank requirements. Section I of this report will present the findings of the social assessment. It will begin by outlining the methodology employed for conducting the assessment; identify the ethnic and minority communities in the project areas and immediate surroundings; discuss the land tenure, land holding and farming practices; provide an overview of the current configuration of

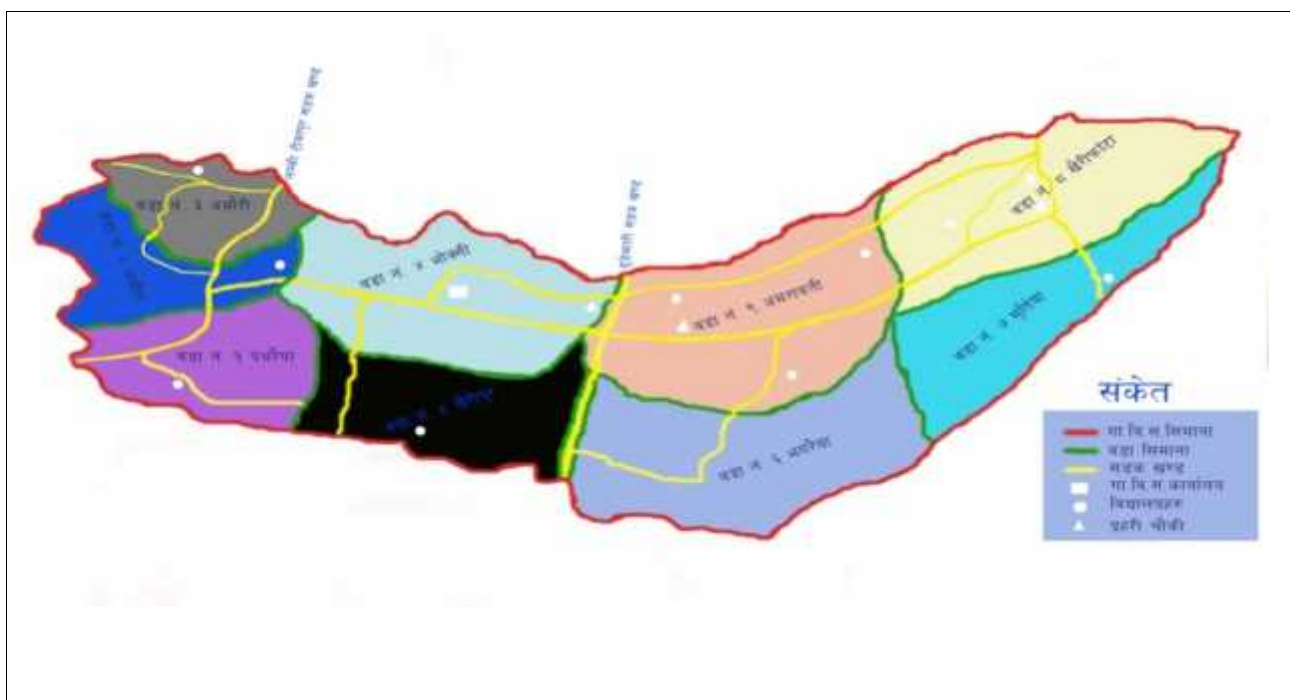
and challenges in the traditional irrigation management systems; discuss the findings of the stakeholder analysis and consultations carried out as a part of this assessment as well as measures taken by the DOI to disseminate information regarding the project; and highlight the world bank .

Rani, Jamara and Kulariya Kulos (or canals) were constructed by farmers more than a hundred years go. These Kulos off-take from Jarahi Naala, western sub-course of the Karnali River. Each Kulo has many branches and sub-branches to irrigate at present approximately 24,000 ha of farmland. Since construction, the Kulo system has been traditionally operated, maintained and managed by traditional irrigation user committees and headed by Kulo Chaudhary of each Kulo¹ . Nepal Government, as per the request of the irrigation users of the Rani, Jamara and Kulariya system, has planned to upgrade the system through proper intakes. The Nepal Government is also requesting the World Bank to assist in financing the project. This assignment is a part of the project for World Bank financing. It has two components. First, a social assessment that will complete the development of a socioeconomic profile of the project; map out stakeholders in the project area; assess various social, economic and political factors that play in the design and implementation of the project; and assess likelihood of the social impacts of the project. Second, on the basis of the social assessment findings, it develops necessary interventions and mitigation strategies under the project in line with relevant government and World Bank requirements.

4.1 General background of the study area

This project commands 8 VDCs and one municipality of kailali district. It is extended from Baliya in north to Dhansingpur in south .The geographical co –ordinate of the project .A motorable gravel road connects the project area with the east west highway at lamki, the average distance between Lamki and the site is 15 km. lamaki ,a small town on the highway ,is 78km far from Dhangadhi Development office is 25208.

Rani Jamara and Kulariya kulo irrigation project Is located in the kailali district of the far western Development region of Nepal. The project is surrounded by Pathariya River on the west mohana on the south, Kaudiyanala (karnali west branch) on the East and forest boundary on the north.



Source: Office of Pathariya VDC 2071

4.2 land use pattern

Land use is determined by cropping pattern, cropping intensity and productivity of the land mainly depended on the land fertility and irrigation facility. An irrigation facility plays a vital role in increasing the land’s productivity as such. Because of the lack of an irrigation facility, the command area has single cropping pattern before the implementation of canal. It’s cropping intensity and productivity was also less than the operation of canal. Therefore, the land use of command area was less in the past stage. But the implementation of irrigation project changed the cropping intensity as well as productivity of the land. The land use increased more rapidly every year after the implementation of Rani Jamara Kulariya Irrigation Project.

4.2.1 Cropping pattern and Production status

Table -4.2.1 cropping pattern and Production status

Types of crops	Total land under cultivation (kattha)	Number of people	Percentage %
Paddy	44	12	18.72

Maize	40	12	18.72
Wheat	42	10	17.87
Pulse	45	8	19.15
Oilseeds	32	9	13.62
Vegetable	32	9	13.62
Total	235	60	100

Source: Field survey 2015

In the above table we can see the production of the different crops and the number of people whose land are used in the production. We can see that 18.72% of people who occupy 44 khatta of land are producing paddy and 18.72% of people who occupy 40 khatta of land are producing maize. Similarly wheat, pulse, oilseed and vegetables are also produced in 42, 45, 32, 32 khattas of land respectively.

4.2.2 Land location

Table-4.2.2 land location status and land value

Sn	Location	Number of people	Percentage %
1	Along the highway	30	50
2	Link road	15	25
3	Other road	15	25
	Total	60	100

Source: Field survey 2015

In the table above we can see the people having their land located in different locations about 50% of people have their land on the highway side and 25% of people have in the side of link road whereas other 25% have link to other roads.

4.2.3 Major factors responsible for the increment of land value

Table- 4.2.3 Major factors responsible for the increment of land value

Sn	Factors	Number of people	Percentage %
1	Irrigation facility	10	16.67
2	Road facility	20	33.33
3	Population growth	5	8.33
4	Marketing facility	15	25
5	Electrification	8	13.33
6	Others.	2	3.33
	Total	60	100

Source: Field survey 2015

In the above table we can see that there are different people having different views. About 33.33% of people have said that because of the road facility there is increase in the land value. About 16.67% of people have said that because of irrigation facility there is increase in the land value. Similarly there are other people who think because of the population growth, marketing facility electrification and due to other reasons there is increase in the land value.

4.2.4 Status of crop production after the construction of RJKIP:

Table-4.2.4 Status of crop production after the construction of RJKIP

Sn	Status	Number of people	Percentage %
1	Increase in crop production.	30	50
2	Decrease in crop production.	10	16.67
3	Constant in crop production.	20	33.33

	Total	60	100
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Source: Field survey 2015

In the above table we can see that there are different people having their views about crop production. About 50% of people have said that after the establishment of RJKIP there is increase in the crop production. About 16.67% of people have said there is decrease in production and about 33.33% of people have said that neither there is increase nor there is decrease in the production.

4.2.5 Irrigated land through the project

Table-4.2.5 Irrigated land through the project

Irrigation type	Area (Kattha)	Number of people	Percentage %
Permanent	135	40	66.67
Seasonal	75	20	33.33
Total	210	60	100

Source: Field survey 2015

In the above table we can see the irrigation facility provided by the project. About 66.67% of people who occupy 135 khattas of land have got permanent irrigation facility where as about 33.33% of people have got seasonal irrigation facility.

4.2.6 Irrigation facilities available before the irrigation project

Table-4.2.6 Irrigation facilities available before the irrigation project:

Sn	Facilities	Number of people	Percentage %
1	Mul/ jaruwa	15	25
2	Pump set	10	16.67
3	Streams	25	41.66
4	Others	10	16.67

	Total	60	100
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Source: Field survey 2015

In the above table we can see that about 25% of people used mul/jaruwa before the irrigation project. About 16.67% of people have used pump set for irrigation and 41.66% people have used streams for irrigation and 16.67 people have used others means for irrigation before the project.

4.2.7 Situation of food grain of in households

Table- 4.2.7, Situation of food grain of in households

Situation	Paddy	Maize	Wheat	Pulse	Oilseed	Vegetable	Total
Surplus	30	15	40	15	30	35	165
Deficit	20	25	5	30	10	15	85
Sufficient	10	20	15	15	20	10	90
Total	60	60	60	60	60	60	

Source: Field survey 2015

In the above table we can see that there are different crops whose production is different from one another according to different people. It is clear that about 165 votes have been in the side surplus in the production of the crops and 85 votes in the side of deficit in the production and about 90 votes in the side of sufficiency.

4.3 Socio economic impact of the Irrigation project

This section tries to reflect the impact of RJKIP on social issues, which includes impact on woman, treatment pattern, toilet facility and the impact by RJKIP on social, educational political and cultural status of people in the command area. Likewise in Rani Jamara kulariy 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 women is lower than 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, rearing 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 started working more, they got less time for themselves. Before the irrigation, women had 3 months where they did not had to work in the farm. So in this 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, rearing 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 affect the rearing 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 education, 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.

4.3.1 Impact in education

Food, shelter, clothing and education are the basic need of the people. So, we must be conscious farmers as well as the school going children. Even primary education is a principal mechanism of fulfilling the minimum learning needs of the people needed for effective participation in the economic, social and civic activities. In this study, we divided the sample 60 HHs in 325 total populations above 6 years in to two group's i. e. literate and illiterate. The literate group was further sub- divided into different classes according to their acquired level of formal education as primary (1-5) classes, secondary (6-10) classes and higher (10+....). Those who can read and write but do not have formal education in school are placed under literate class. The following table 4.3.1 shows the educational impact of the study area.

Table – 4.3.1, Impact Educational in Sample Population

Level of Education	Before %	After %
(A) Illiterate	21	14
(B) Literate	79	86
Primary	45	37
Secondary	42	53
Higher	13	20

Source: Field Survey, 2015

From the table – 4.3.1, it is observed that the literacy rate in the study area is before (79%) and after increase (86%) higher than that of national average (65%). Only about before (21%) less then (14%) of total populations are illiterate and rests of them are literate. Out of total literate population, before 45% and after 37% are studying in primary level, before 42% and 53% in secondary level and 20% have completed school level education or even more. In the study area 2.94 % people are increases literate.

4.3.2 Impact in income of the Study Area

Agriculture is the main sources of income in the study area. Most of the people are involved in agriculture occupation and few are involved in others services. The status of people’s households clearly shows by below table.

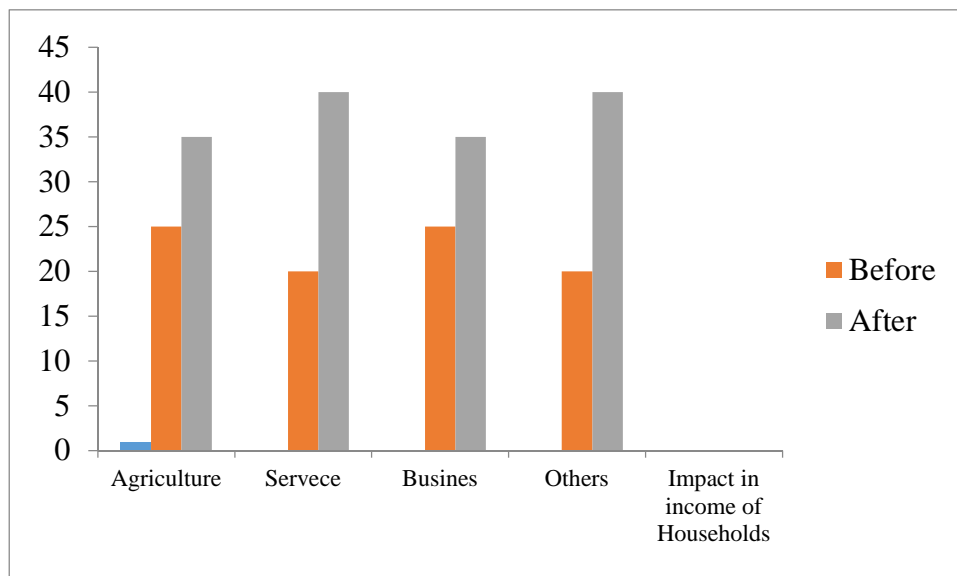
Table – 4.3.2, Impact in income of Households

Sn	Profession	Before	After
1	agriculture	25	35
2	Service	20	40
3	Business	25	35
4	Others	20	40

Source: Field Survey, 2015

Table no. 4.3.2 show that the total sample households are 60 out of which before 25 and after 35 HH are involved to agriculture development. There is increase in the number of people in the profession. In service before there were 20 and after development there are 40. We can see that there is increase in every profession due to development.

Figure-4.3.2



Source: Based on the table no- 4.3.2

Above figure no. 4.3.2 shows that in total 60 households before then after in case these households are in agriculture, service, business and others increasing. Economic status is the impact in income in their income and expenditure.

4.3.3 Impact in expenditure

Table no.- 4.3.3 Impact in expenditure

Sn	Expenditure	Before	After
1	Food	25	35
2	Clothes	20	40
3	Education	20	40
4	Refreshment	15	45

In the above table we can see that there is increase in the expenditure in every sector such as in food there were 25 before and now there are 35 and so on.

4.3.4 Change in development

Table no- 4.3.4 Impact in development

Sn	Development	Before (HH)	After (HH)
1	Kulo	25	35
2	Nahar	20	40
3	Roods	18	42

Source: Field survey, 2015

In the above table we can see that the number has increased in the use of kulos and nahar.

Before there were 25 and now there are 35 who use kulo and before there were 20 and now there are 40 who use nahar.

4.3.5 Change Occupation

Agriculture has been the main stream for employment and hence income generating activity. Thus, it can be said that agriculture is a way of life for this ward. On the basis of primary occupation, the dwellers can be divided into six different categories such as agriculture, services, business, student and others. The occupational structure of population based on sampling household is given below.

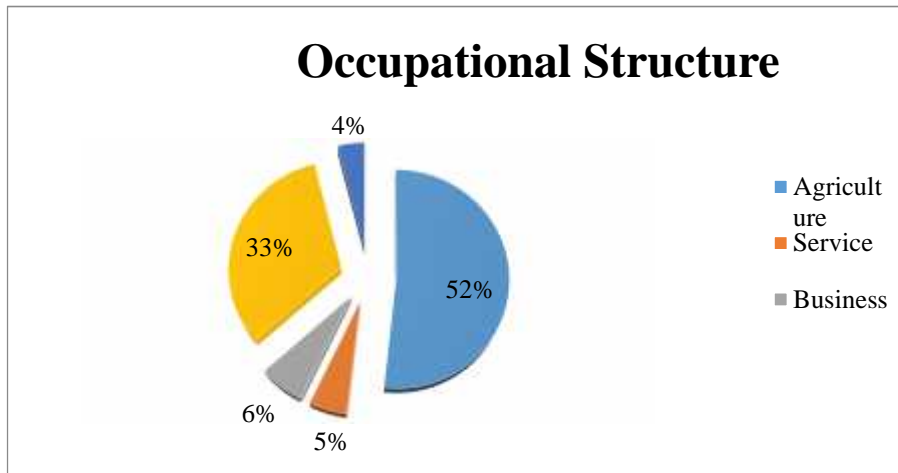
Table – 4.3.5, Occupational Structure

Occupation	No. of Persons	Percentage (%)
Agriculture	165	52
Services	19	5
Business	22	6
Student	103	33
Others	16	4
Total	301	100

Source: Field Survey, 2015

According to the table – 4.3.5, the highest number 52% of population are engaged in agriculture. Student includes the second highest number 33% of population are engaged. Business and service included 6% and 5% respectively engaged. A remarkable number 4% of population are engaged in the other activities that includes tailoring, carpentry, masonry and foreign workers. Among the remaining other economically active people, some are school boys and some are unemployed. The occupational chart would illustrate clear picture of the occupational structure of household

Figure-4.3.5



Source: Based on the table no. – 4.3.5

4.3.6 Production

Table no- 4.3.6 agriculture production in study area

Sn	Variety (Per Bigaha)	Before	After
1	Paddy	20 quintal	35 quintal
2	Maize	30 quintal	40 quintal
3	Wheat	20 quintal	30 quintal

Source: Field Survey, 2015

In the above table we can see that after development there is increase in every variety. Such as paddy has increased by 15 quintals than before same as maize by 10 quintal and wheat by 10 quintal.

In the above table we can see that about 33.33% people believe that because of irrigation facility there is increase in the production. Similarly about 25% of people believe because of utilization of improved seed and about 16.67% of peoples believe in increase in cultivated land and fertilizers and 8.33% of people believe on other factors for the incensement in production.

4.3.7 Food sufficiency

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 before 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 RJKIP, 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. So that overall food situation is differed in the study area between before and after 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 RJKIP.

Table no- 4.3.7 Food sufficiency

Sn	Food Sufficiency	Before	After
1	Paddy	No	Yes
2	Maize	No	Yes

Source: Field Survey 2015

In the above table we can see that before there wasnt sufficient food but after development there is food sufficiency.

4.3.8 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 RJKIP and the land was cultivated only 6-7 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 Tikupur bazer , grazing cattle etc. Anyway, people were less busy due to the less work land among the inhabitants before operation of RJKIP. The cropping pattern, crops variety as well as cropping intensity of the cultivated land have

changed with the advent of RJKIP. The land is cropped throughout the year that needs more labors. The crops like paddy, seasonal and up seasonal vegetables need more labor in every season. That is why; the farmer's have become busier in the field. As said by the farmers, the triple cropping pattern made them busier. They always have to hurry up to follow the next crop after the first crops

4.4 Problem and prospects

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 RJKIP.

4.4.1 Rise of conflict

Table-4.4.1 Conflict among local people or with project

Sn	Particular	Number of people	Percentage %
1	Distribution system	20	33.33
2	Management system	15	25
3	Socio-cultural reasons	15	25
4	Others	10	16.67
	Total	60	100

Source: Field survey 2015

In the above table we can see that due to lack of distribution of system 33.33% of people believe that there is conflict. About 25% of people believe because of lack of management system and other 25% believe because of socio cultural reason and 16.67% believe in other reasons which causes conflict.

4.4.2 Damage in canal

Sn	Damaging factor	Before	After
1	Irrigation canal	Yes	No

Source: Field Survey 2015

In the above table we can see that before there was a huge damage in production but due to development there is no any damage.

4.4.3 Users committee

Sn	Technique	Before	After
1	Modern	no	Yes
2	Traditional	Yes	No

Source: Field Survey 2015

In the above table we can see that before the people used traditional technique but now they are using different modern technique by conducting user committee.

4.4.4 Distribution of water

Sn	Distribution	Before	After
1	Equal	no	Yes

Source: Field Survey 2015

In the above table we can see that before there was not equal distribution of water but now there is equal distribution of water.

The problems of agricultural system are categorized as follows:

- Distribution of water through RJKIP 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.
- 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.
- Lack of the cold store and warehouse in the study area.

CHAPTER -FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 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 belt 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 Rani Jumara Kulariy Irrigation Project is also a surface irrigation project. It is under the program 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 RJKIP.

Rani jumara kulariya Irrigation Project is located at Pathariya VDC of Kailali district in seti zone of Far - western Development Region. The Mahendra Highway passes through the command area and linked with metalled road. man canal karnali river in the karnali bridge near located. The project area is settled in different wards of Pathariya VDC as ward No. 1,2,3,4 and 9, in which some portion of ward no. 4 and 2 has lack of irrigation facility. There are 1088 households resided Chhetri, Brahmin, Tharu, Thakuri , Damai, Kami etc. The dominant ethnic group 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 the 36 percent of the economically active population are involved in agriculture. The rate of study area is higher than the literacy rate of Pathariya 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 RJKIP. 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 up to about 63.15 percent of the total cultivated land, but this figure was only 38.84 percent before the construction of RJKIP (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 RJKIP, 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. The multiple issues bound up in the sustainable development/ sustainability debate are inevitably transferred to the concept of sustainable tourism. Again, the lack of any universal definition has lead to a multiplicity of tailor-made meanings and applications.

As with sustainable development, there is the freedom to adopt varying ‘shades of green’ in approaching sustainable tourism. From the light green approach that holds tourism development and tourist and operator satisfaction as the central aim to the darker green in which the precautionary principle and concept of carrying capacities feature highly

(Hunter, 1997). The stance adopted has major implications as it will govern the approach to implementation and hence the

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.

5.2 Conclusions

Based on the above findings, it can be concluded that, after construction of RJKIP, irrigated area of VDC Pathariya 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 RJKIP in many ways, such as: It has brought change in cropping pattern which has promoted the agricultural production thereby raising their living standards. RJKIP 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 RJKIP. The work load has increased and people are busier today. Basically, the status of women is not changed considerably. It is still male dominant and they are busier 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.

5.3 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 RJKIP .

- 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 RJKIP and other government, semi-government as well as private and nongovernmental organization in that area.
- It is necessary to formulate an effective programmer 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. A well equipped agriculture research center should be established in Pathariya VDC.

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ANNEX - I

Household Survey Questionnaire:

1. General information of the Households:

a) Name of Respondent

b) Zone : District: VDC:

Word No: Village/ Tole:..... Block No.:

c) Total population of the family

Male.....Female.....

d) Family's information:

S. N.	Name	Sex	Age	Education	Occupation
1.					
2.					
3.					
4.					
5.					
6.					

2. What is your consumption pattern from irrigation?

Income:

Income	Before	After
Agriculture		
Service		
Business		
Other		

Expenditure:

Head	Before	After
Food		
Cloth		
Education		
Refreshment		
Other		

3. How much cultivable land do you have at this place?

Ownership	Irrigated (kattha)	Non- irrigated (kattha)	Total (kattha)
Own land			
Rented in			
Rented out			

4. Was irrigation facility available in your land through RJKIP?

a. Yes []

b. No []

5. If yes, how much of your land is irrigated through the project?

Irrigation type	Area (Kattha)	Worship
Permanent		
Seasonal		
Total		

6. Cropping pattern and Production status:

Types of crops	Total land under cultivation (kattha)	Production (in Quintal)

Paddy		
Maize		
Wheat		
Pulse		
Oilseeds		
Vegetable		
Total		

7. What is the situation of food grain of your households?

Situation	Paddy	Maize	Wheat	Pulse	Oilseed	Vegetable
Surplus						
Deficit						
Sufficient						

8. If you have surplus, then what is the amount of Surplus?

Variety	Quantity (Quintal)	Rate (per Quintal)	Amount
Paddy			
Maize			
Wheat			
Pulse			
Oil seed			
Vegetable			
Other			
Total			

9. If the food grain was deficit, how do you manage your food deficit?

- a. By borrowing from others []
- b. By taking loan []
- c. By earning wages []
- d. Where []
- e. Others (Specify).....

10. What types of agricultural inputs do you use in the field (including the crops)?

a. Seeds:

local [] improved [] both []

b. Fertilizers:

compost [] chemical [] both []

c. Tools:

traditional [] modern [] both []

d. Insecticides:

a. yes [] b. no [] c. if modern tools.....

11. What types of irrigation facilities were available before the irrigation project?

- a. Mul/Jaruwa []
- b. Pump set []
- c. Streams []
- d. Others.....

12. How much additional land has been irrigated after the completion of this irrigation project? (inkattha)

- a. in summer
- b. in winter

13. Where is your land located?

- a. Along the highway
- b. Link road
- c. Other road

14. What is the change in the land value because of the irrigation project?

From Rs. To Rs. (perKattha)

15. In your opinion, what are the major factors responsible for the increment of land value?

- a. Irrigation facility []
- b. Road facility []
- c. Population growth []
- d. Marketing facility []
- e. Electrification []
- f. Others.

16. Which crops do you use to produce before the irrigation project and which crops are you producing after the irrigation project?

Before the Irrigation Project

- a.....
- b.....
- c.....
- d.....

After the Irrigation Project

- a.....
- b.....
- c.....

17. In your opinion, what are the direct benefits of irrigation to your family?

- a. To increase the cultivated land area. []
- b. To increase crops production. []
- c. Land value.....
- c. Others (specify).

18. Status of crop production after the construction of RJKIP:

- a. Increase in crop production. []
- b. Decrease in crop production. []
- c. Constant in crop production. []
- c. Others.....

19. If increase in crop production, what are the causes?

- a. Achievement of irrigation facility. []
- b. Utilization of improved seeds. []
- c. Increase in cultivated land. []
- d. Utilization of fertilizer. []
- e. Others.....

20. If decrease in crop production, what are the causes?

- a. Technical Problem of Cannel or Irrigation system. []
- b. Due to the lack of regular water supply in all season. []
- c. Irrigation office has not equally distributed the water. []
- d. Others.....

21. Was there any notable case of conflict among local people or with project?

- a. Yes []
- b. No []

22. If, Yes what are the reasons behind it.

- a. Distribution system []
- b. Management system []
- c. Socio-cultural reasons []
- d. Other.....

23. As a farmer are you satisfied with service provided by RJKIP?

- a. Yes []
- b. No []

24. If, no, what are the major problems faced by a Farmer under RJKIP?

- 1.....
- 2.....
- 3.....

25. Can you give any suggestions of improve the irrigation project?

- 1.....
- 2.....
- 3.....

ANNEX - II

Focus Group Discussion

- 1) The Rani jamara kulariya irrigation project needed this area?
- 2) What do you think irrigation project is change in this area?
- 3) Do you know about this Rani Jamara Kulariya irrigation project?
- 4) There are about this irrigation project before irrigated these areas?
- 5) There are how many changes in agriculture product, does u know?
- 6) What are the changes do your get agriculture before then current irrigation project?
- 7) What are the changes in area of the price before and after then irrigation project?
- 8) There are change comes in your area after then irrigation project?
- 9) In these you're in area doesn't comes after irrigation project?
- 10) Status of crop production after the construction of RJKIP?
- 11) Which crops do you use to produce before the irrigation project and which crops are you producing after the irrigation project?
- 12) Was irrigation facility available in your land through RJKIP?
- 13) Was there any notable case of problems among local people or with project

ANNEX- III

VDC Level key informant Checklist

Name of Respondent:

Designation:

Date:

1. 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

Childs labour: Rs./Day

Boy: Rs./Day

Girls: Rs./Day

2. Are the farmers benefitted by this irrigation project?

Explain:

Photos of RJKIP Intake



Source: Field Observation 2015



Source: Field Observation 2015.