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Problems and Prospects of Agricultural Change on Efforts to Development in Rural Areas of Bangladesh A

Md. Repon, Abu Russel

University of Rajshahi

Problems and Prospects of Agricultural Change on Efforts to Development in Rural Areas of Bangladesh

A Dissertation Submitted for the Degree of Doctor of Philosophy in Sociology under the Faculty of Social Science

Submitted by

Abu Russel Md. Repon

PhD Fellow
Session: 2010-2011
and
Assistant Professor
Department of Sociology
University of Rajshahi
Rajshahi-6205
Bangladesh

A Dissertation Submitted for the Degree of Doctor of Philosophy in Sociology

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Declaration

I do hereby declare that the thesis entitled *Problems and Prospects of Agricultural Change on Efforts to Development in Rural Areas of Bangladesh* submitted to the university of Rajshahi for the degree of Doctor of Philosophy in Sociology is exclusively my own and original research work. No part of it, in any form, has been submitted to any other university or institute or organization for any degree or diploma for other similar purposes.

Date:.....

Abu Russel Md. Repon

PhD Fellow
Session: 2010-2011
and
Assistant Professor
Department of Sociology
University of Rajshahi
Rajshahi-6205
Bangladesh

Certificate

It is my sincere declaration that the thesis, entitled *Problems and Prospects of Agricultural Change on Efforts to Development in Rural Areas of Bangladesh* prepared by Abu Russel Md. Repon, is a completely new and original research work. He has conducted this research under my supervision at the Department of Sociology, University of Rajshahi. I do hereby recommend him to submit the thesis in partial fulfillment of the requirement for the degree of Doctor of Philosophy in the discipline of Sociology under the Faculty of Social Science.

Professor AKM Shafiul Islam PhD

Research Supervisor
Department of Sociology
University of Rajshahi
Rajshahi-6205
Bangladesh

Dedicated

To

My Father and Mother

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Abstract

Agriculture has been the backbone of the economy in Bangladesh providing employment and source of livelihood for the increasing population. To improve agricultural productivity in rural areas of Bangladesh, a holistic solution rather mechanical, view of what drives and agricultural productivity need to be taken. This study has been conducted at Bilsha of Gurudaspur upazilla under the district of Natore in Bangladesh where all of the people directly or indirectly depend on agricultural production. People become happy in terms of any successful agricultural production and, also very unhappy and disappointed for the destruction of their production by any natural calamities or unfavorable conditions. After 'Green Revolution' agricultural production is increased more that is like High Yielding Varieties (HYV) produced more in the research area. Once upon a time they produced local varieties of crops that produced fewer amounts of crops like rice, mustard. The problems which are facing in the study area are identified by this research and also prospects in relation to agricultural production are also identified by this research. This research is completed through using sociological methods like social survey, case study and participatory rural appraisal, and tries to explore the agricultural change and its relations with development in rural areas of Bangladesh. Besides these, key informant interview method is also used in the present study. Through this research it is tried to know and identify the following subject matters:

- ►to know the socio-economic condition in terms of development of the rural people that are very much related with the agricultural production.
- ► to know the land tenure system in rural areas that is achieving and losing on the basis of successful agricultural production.
- ► to identify the nature of agricultural production and change that help to the real scenario of agricultural production in the study area and rural areas as well. .
- ► to investigate the nature of agro-ecological system that is important for agricultural production and soil fertility as well.

► to find out the environmental as well as climatic impact on agriculture that creates threat for the agricultural production in rural development.

The major findings of the research are: agricultural production system has been changed in nature due to high yielding varieties and modern varieties crops, agricultural production has been increased because of high yielding varieties and modern varieties with respondent's awareness, income has been increased in rural area for increasing agricultural production and creation of opportunities, savings has been increased in rural area due to the awareness and opportunities, occupational opportunities have been created in the rural area because of multiple crops production and other opportunities, tendency of taking education by the children has been increased because of creation opportunities and awareness of the respondents, the nature of land tenure system has been changed due to practice of leased and other systems, housing pattern has been developed in the rural area because of financial solvency and needs that imply the development of rural people, opportunities are creating in terms of development in rural area for multiple crops production and infrastructural development, agro-ecological system has been degraded due to over use of chemical fertilizer and pesticides, natural calamities create obstacle in agricultural production in many ways like draught, fog, hailstorm etc. Over all agricultural problems have negative impact on efforts to development and agricultural prospects have positive impact on efforts to development in the study area as well as rural areas of Bangladesh. This scenario imply that being an agricultural dominant country like Bangladesh has been improved remarkably in agriculture that helps to develop rural livelihood and opportunities in the rural areas of Bangladesh.

Abbreviations

a+a+n=Availability, Accessibility and Nutrition

AEZ: Agro-ecological Zone

FGD: Focus Group Discussion

GDP: Gross Domestic Product

HY: High Yielding

HYV: High Yielding Varieties

IPM: Integrated Pest Management

LLPm: Low Lift Pump

MAS: Myanmar Agriculture Service

mMT: Million Metric Ton

MDG: Millennium Development Goal

MV: Modern Varieties

NR: Number of Respondents

PRA: Participatory Rural Appraisal

SDP: State Domestic Product

SSP: Single Super Phosphate

STWs: Shallow Tube Wells

TSP: Triple Super Phosphate

UNDP: United Nations Development Programme

UP: Union Parishad

USAID: United States Agency for International Development

WB: World Bank

Glossary

Aga: Top of the crops

Angla: An iron material for weeding.

Balti: A tin made pot that preserves an amount of water.

Bosta: Jute or plastic made big bag.

Cannel: It is the branch of river.

Chatal: Two storied room which is made by soil and clay.

Doan: Tools of traditional irrigation which is made by palm tree.

Golaghor: Place of keeping rice.

Goli: Small road for walking within the para.

Gora: Bottom of the crops

Hari: Earthen pot which is used for various domestic needs.

Jhaka: Made from bamboo that is used for various domestic needs.

Jhata: Made by bamboo that is used in cleaning the yard.

Kacha Rasta: The road which is made of soil.

Kachi: An iron material which is used for weeding and cutting the crops.

Kakra: One kind of small animal that is harmful for the crops production.

Khaita: Made by bamboo for using agricultural and domestic needs.

Khaonti: It is practiced in mortgage system.

Koat: It is actually mortgage system but well known to all as koat locally.

Kodal: An iron material which is used for making drain, boundaries of the arable land and other domestic activities where is necessary.

Kolosh: An earthen pots which is mainly used in preservation of water and, other domestic and agricultural activities.

Macha: It is made by bamboo stick for crushing crops by dint of hand.

Molon: It is completed by cows for crushing the crops.

Nikari: Muslim fishermen called as nikari.

Pachon: An iron material which is used for weeding the crops.

Para: Para is consisted of some homes which is also the symbol of identity.

Roshi: It is made of jute that is used for keeping and bearing crops, and other domestic activities.

Samaj: Somaj is an organization which is established in rural society to control and maintain the society by some rules and regulations.

Shaluk: It was used for food which grows under water.

Shamaj: It is an organization of rural society which controls the social activities.

Shewti: Tools of traditional irrigation which is made by tin.

Suti: It is the tools of catching fish by long tail in the place of river or any place where heavy water flow.

Talaimora: It is used for keeping crops for long time.

Thor: It is the pre-moment of crops (rice, wheat and maize) and symbol of successful crops production.

Vut Machine: The machine which is used for crushing crops.

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CHAPTER - ONE

INTRODUCTION

1.1 Background of the Study

Bangladesh forms the largest delta in the world and is situated between 88° 10/ and 92° 41/ East longitudes and between 20° 31/ and 26° 38/ North Latitudes. The great delta is flat throughout and stretches from near the foot-hills of the Himalayan Mountains in the north to the Bay of Bengal in the south (BBS, 2001).

Bangladesh is a predominant agricultural country. Agricultural contribution is much more than industrial on economy. Though population growth creates pressure on production but development is found in different time. According to Rahman (1993), "Agriculture continues to remain the most important sector in Bangladesh. Though, its share in total GDP has declined to around 40% in 1990/91, it still employs 55% of the total labour forces". Virtually no "open" land existed for agricultural expansion (Hossain, 1988), and arable lands were lost to settlement. Agricultural growth, therefore, focused on increasing land productivity—intensification achieved primarily through increased irrigation, which facilitated double and triple cropping and the use of "green revolution" inputs (i.e., crops, fertilizer, pesticides). Socio-economic constraints to the intensification process operated, however, including government policies that favored the urban consumer over the farmer and the large-holder over the small-holder (Ahmad, 1984), as well as the overall impoverished condition of most farm households that made capital improvements difficult (Vylder, 1982).

Agriculture is central to the economy and the society of Bangladesh, but, perhaps more importantly, it represents the basic sector from which overall future economic growth must emanate. Approximately 80 percent of the total population lives in rural areas and most are engaged in some phase of agriculture-growing, starting, transporting, processing, or marketing. Agriculture in Bangladesh is essentially a rice monoculture food production constitutes the most egregious weakness and the most persistent need in the economy (Wennergren *et al*., 1984). Bangladesh

agriculture achieved significant production transformation. The process is underpinned by the use of agro-chemicals, ground water irrigation and increased incidence of multiple cropping. Foodgrain production has more than doubled over a period of three decades since independence (Alauddin, 2005). Land use in Bangladesh is mainly for agriculture with about 35 million acres cultivated of which 60% is in crop production (Huq *et al.,* 1990).

Rural people are trying to reduce poverty by surplus agricultural production. Development is being found in different cases in rural areas. Though people of Chalon beel face various problems but they look forward to develop themselves as well as the country, because agricultural production helps to create food security to the rural people and country as a whole. This study will help to find out the agricultural change on efforts to development in rural areas.

1.2 History of Agriculture

Agriculture was developed at least 10,000 years ago, and it has undergone significant developments since the time of the earliest cultivation. Independent development of agriculture is also believed to have occurred in northern and southern China, Africa's Sahel, New Guinea and several regions of the Americas. Agricultural practices such as irrigation, crop rotation, fertilizers, and pesticides were developed long ago but have made great strides in the past century (Binford, 1968).

Last stage of plaistosin or from the beginning of holosin to 3500 years ago of BC is called the new Stone Age. Pastoral and agriculture were the main invention of this age. Simply, men were food gather in the Old Stone Age and become food producer in new Stone Age (Islam, 1978). The livelihood is becoming new paths besides hunting, fishing and rearing of livestock by the invention of agriculture. The world agriculture has long been associated with the growth of civilization (Halcrow, 1980).

Descended from wild grasses, rice is a staple food in South Asia. Historians believe that it was first domesticated in the area covering the foothills of the Eastern

Himalayas (north-eastern India), and stretching through Burma, Thailand, Laos, Vietnam and Southern China. About 2000 years ago, rice was well-established as the main cereal of the sub-continent, with barley second and wheat a barely mentioned winter food. Indian subcontinent has a remarkable history of agriculture. Kosambi says, "Artificial irrigation for agriculture in Indian subcontinent has a long history and can be traced back in somewhere between post-Dravidian and pre-Aryan period (cited in Bose, 1942). He also mentions that Rig-Veda depicts a picture of vast irrigation work maintained by state and Arthashastra of Kaulilya refers to similar picture of this state enterprise ... Considerable part of Indus-agriculture developed depending on over flow irrigation by seasonal damming of the river (cited in Bose, 1942). The main type of wealth was land in pre-British India. So, economy was depending on agriculture. Social relationships and activities were sustained on the basis of agricultural economy. The root of agro-based economy was village community. Social stratification essentially created on the basis of land relationships. Here, agriculture was depending on nature. Especially it was a fact for water supply. Karim (1956) says, "An Indian state was attributed to maintain as extensive irrigation and public works, as because it witnessed rainfall only once a year the monsoon period. Therefore, primary functions of the state were to look after water supply … to sink wells and build canals, tanks and reservoirs." As a result it helps to create bureaucracy. Weber (1950) says, … existence and extensive domination of bureaucracy compulsory services of the dependent classes, existence of military organization and its monopoly power exercise through the state power in the oriental societies … was due to the crucial importance of irrigation in the East.

Agriculture plays significant role after creation of Pakistan which may be important for socio-economic development. Hassan (1996) says, "Bangladesh has a long history of colonial rule (British and Pakistani colonial forces) for more than 200 years. The British involvement in Bangladesh agriculture was mainly limited to the changes in revenue administration and little attention was given by the government

in agricultural development." On the same way throughout the Pakistan period (1947-1971) agriculture remained a neglected sector and was assigned the passive role of supplier of foreign exchange. Yet in sixty decade change is found in agriculture. Land is treated an important elements which help to individual as well as social development. Westergard and Hossain (1998) mention, the expansion of irrigation started in the mid 1970s with the promotion of shallow tube wells. From the beginning these were sold to private individuals almost at cost, and the sales increased rapidly during the period 1979 to 1983. Independent Bangladesh takes various steps for the development of agriculture as an agro-based country. Agricultural change is playing significant role on different socio-economic aspects in rural areas. So it is said that "agriculture is a science, a craft and a business". In the final statement of world economic summit mention, "agriculture is the occupation of the majority of workers throughout the world."

1.3 Present Scenario of Agriculture in Bangladesh

Bangladesh agriculture at a glance, total farm holding is 1,47,16,000, total area is 14.845 million hectares, cultivable land: 8 million hectares, current fallow land is 0.469m hectares, annual food production is 31.9m MT and annual food demand is 31.9m MT. The strategies of Bangladesh agriculture are self-sufficiency in food in 2012, ensuring food security in 2017(a+a+n) and become middle income country within 2022. The characteristics of Bangladesh agriculture are cropping intensity 179%, irrigated land 56%, surface water 21%, groundwater 79%, land-man ratio .06 ha, mainly subsistence farming, inadequate agro-processing, non-mechanized farming, fragmented land/plots and dependence largely on nature. The importance of agriculture are 21% in GDP, 48% in labor force, source of raw materials as backward and forward linkage for agro based industries, agriculture determines people's lives and livelihood of this region, people living in rural areas 77% and export value is 12%. Government's recent interventions are farmers' database and farmers' inputs support card to 1 Crore 82 Lakh farmers, increased subsidy on agricultural inputs (Fertilizer, diesel, electricity and seeds), farmer friendly

agricultural credit policy, 1 Crore 82 Lakh farmers' new bank accounts being opened, 100 Hr. free supplementary irrigation, enhanced agricultural rehab grants to victims of natural calamities, support for accelerated mechanization of agriculture and surface water irrigation (Ministry of Agriculture, 2010).

1.4 Agricultural Revolution

Agriculture has played a key role in the development of human civilization. Until the Industrial Revolution, the vast majority of the human population labored in agriculture. Development of agricultural techniques has steadily increased agricultural productivity, and the widespread diffusion of these techniques during a time period is often called an agricultural revolution. A remarkable shift in agricultural practices has occurred over the past century in response to new technologies.

1.4.1 Neolithic Revolution

The **Neolithic Revolution** is the first agricultural revolution—the transition from hunting and gathering to agriculture and settlement. Archaeological data indicate that various forms of domestication of plants and animals arose independently in six separate locales worldwide, with the earliest known developments taking place in India and the Middle East around 10,000 BP (Gupta, 2010).

The term *Neolithic Revolution* was coined in the 1920s by Vere Gordon Childe to describe the first in a series of agricultural revolutions in Middle Eastern history. The period is described as a "revolution" to denote its importance, and the great significance and degree of change affecting the communities in which new agricultural practices were gradually adopted and refined (Diamond, 1999). This transition everywhere seems associated with a change from a largely nomadic hunter-gatherer way of life to a more settled, agrarian-based one, with the inception of the domestication of various plant and animal species—depending on the species locally available, and probably also influenced by local culture (Smith, 1976).

1.4.2 The Arab Agricultural Revolution

The Arab Agricultural Revolution (also known as the Medieval Green Revolution, Muslim Agricultural Revolution, Islamic Agricultural Revolution and Islamic Green Revolution) is a term coined by the historian Andrew Watson in his influential 1974 paper postulating a fundamental transformation in agriculture from the 8th century to the 13th century in the Muslim lands (Watson, 1974).

Muslims widely practiced cash cropping and a crop rotation system in which land was cropped four or more times in a two-year period. Muslims developed a scientific approach based on three major elements; sophisticated systems of crop rotation, highly developed irrigation techniques, and the introduction of a large variety of crops which were studied and catalogued according to the season, type of land and amount of water they require (Galloway, 1977).

The productions of some crops were transformed into large industries during the Muslim Agricultural Revolution. Watson argued that the economy established by Arab and other Muslim traders across the Old World enabled the diffusion of many crops and farming techniques among different parts of the Islamic world, as well as the adaptation of crops and techniques from and to regions beyond the Islamic world (Watson, 1974).

1.4.3 The British Agricultural Revolution

The British Agricultural Revolution describes a period of development in Britain between the 17th century and the end of the 19th century, which saw an epoch-making increase in agricultural productivity and net output. This in turn supported unprecedented population growth, freeing up a significant percentage of the workforce, and thereby helped drive the Industrial Revolution (Overton, 2002). The Agricultural Revolution in Britain proved to be a major turning point in history. The population in 1750 reached the level of 5.7 million. This had happened before: in around 1350 and again in 1650. Each time, either the appropriate agricultural infrastructure to support a population this high was not present or plague or war

occurred (which may have been related), a Malthusian catastrophe occurred, and the population fell (Kagan, 2004).

The British Agricultural Revolution was the cause of drastic changes in the lives of British women. Before the Agricultural Revolution, women worked alongside their husbands in the fields and were an active part of farming. The increased efficiency of the new machinery, along with the fact that this new machinery was often heavier and difficult for a woman to work, made this unnecessary and impractical, and women were relegated to other roles in society. To supplement the family's income, many went into cottage industries (Valenze, 1995).

1.4.4 Green Revolution

Green Revolution refers to a series of research, development, and technology transfer initiatives, occurring between 1943 and the late 1970s that increased industrialized agriculture production in India; however, the yield increase has also occurred world wide. The initiatives involved the development of high-yielding varieties of cereal grains, expansion of irrigation infrastructure, and distribution of hybridized seeds, synthetic fertilizers, and pesticides to farmers. The term "Green Revolution" was first used in 1968 by former USAID director William Gaud, who noted the spread of the new technologies and said, "These and other developments in the field of agriculture contain the makings of a new revolution. It is not a violent Red Revolution like that of the Soviets, nor is it a White Revolution like that of the Shah of Iran. I call it the Green Revolution" (Gaud, 1968).

Cereal production more than doubled in developing nations between the years 1961–1985 (Shiva, 1991). Yields of rice, maize, and wheat increased steadily during that period. The production increases can be attributed roughly equally to irrigation, fertilizer, and seed development, at least in the case of Asian rice (Pimentel, 1996).

Green Revolution techniques also heavily rely on chemical fertilizers, pesticides and herbicides, some of which must be developed from fossil fuels, making agriculture increasingly reliant on petroleum products. The world population has

grown by about four billion since the beginning of the Green Revolution and many believe that, without the Revolution, there would have been greater famine and malnutrition. The average person in the developing world consumes roughly 25% more calories per day now than before the Green Revolution. Between 1950 and 1984 as the Green Revolution transformed agriculture around the globe, world grain production increased by over 250% (Kindall, & Pimentel, 1994).

The transition from traditional agriculture, in which inputs were generated on-farm, to Green Revolution agriculture, which required the purchase of inputs, led to the widespread establishment of rural credit institutions. Smaller farmers often went into debt, which in many cases results in a loss of their farmland (Ponting, 2007).The increased level of mechanization on larger farms made possible by the Green Revolution removed a large source of employment from the rural economy.

Modern agriculture is a term used to describe the wide majority of production practices employed by America's farmers. The term depicts the push for innovation, stewardship and advancements continually made by growers to sustainably produce higher-quality products with a reduced environmental impact. Intensive scientific research and robust investment in modern agriculture during the past 50 years has helped farmers double food production while essentially freezing the footprint of total cultivated farmland (Ruben et.al., 2002). With the rapid rise of mechanization in the late 19th century and 20th century, particularly in the form of the tractor, and later the Combine harvester, farming tasks could be done with a speed and on a scale previously impossible. While chemical fertilizer and pesticide have existed since the 19th century, their use grew significantly in the early 20th century.

1.5 Statement of the Research Problem

World population continues to grow. According to recent United Nations population projections, the world population will grow from 5.7 billion in 1995 to 9.4 billion in 2050, 10.4 billion in 2100, and 10.8 billion by 2150, and will stabilize at slightly fewer than 11 billion around 2200. The rate of population increase is

especially high in many developing countries. In these countries, the population factor combined with rapid industrialization, poverty, political instability, and large food imports and debt burden, make long-term food security especially urgent (Gold, 2007).

The Bengal Basin is one of the most land stressed and economically impoverished regions on earth, and Bangladesh is the anchor of the basin. A country of 143,999 km^2 is occupied by nearly 119.8 million people, creating an average population density of 832 people per km^2 (Hossain, 1988). Approximately 84% of population is rural, attempting to meet a major portion of its needs through agriculture. Land is intensively cultivated everywhere; the average cropping frequency approaches two harvests per plot per year. Traditional methods of irrigation include pitcher, swing basket, and a hollowed-out log fixed on a pivot and fitted with a counterbalance. These methods have a natural grace and beauty and are still very few practiced in rural areas throughout Bangladesh. They offer the dual advantages of depending entirely on locally available materials and on human power for their operation. In those rural areas where electricity is available, tube wells with electric pumps are becoming an important irrigation device.

Bangladesh is a developing country. Its economy is predominantly agro-based and more than 60 percent of the total labor force is attached to and dependent on agriculture (Mia, 1993). Like other developing countries in Bangladesh industrialization process is not stands on expected line. Rural areas are lag behind than urban areas. The development of rural areas varies from rural areas to areas. The areas which are underdeveloped face various problems. But taking different risk people are trying to improve their livelihood day by day.

The MDG Needs Assessment and Costing 2009-2015 for Bangladesh makes a wide range of recommendations for achieving the Goal to reduce hunger. It advocates that support for poor farmers and agriculture is the most cost effective route to poverty reduction. Improved productivity should be tackled by bringing the ideas of modern research and development into the rural economy. Seed selection and

prudent soil and water management are fundamental. Marketing opportunities can be improved through storage and processing facilities, supported by transport infrastructure. Rice is the staple food of the people of Bangladesh. Production of this crop is very important in terms of food security. Rice provides more than half of the income of farmers and employment opportunities for rural labor force (Hossain, 1989). Rice production is however, the main source of farmers' income in the rural area. The growth in agricultural labor is related with the increase in rice production. Rice in Bangladesh is grown in three distinct seasons; Boro (January to June), Aus (April to August) and Amon (August to December). Adoption of modern rice varieties and associated technologies seems to offer an opportunity to increase output and income substantially (Alam and Jabber, 2008). Now Boro is produced mostly in the study area. Before 20-50 years ago Aus and Amon produced in this area.

Climate and agriculture are both inter-linked. Climate more than any other single environmental factors determines the vegetation of a locality. It exerts the primary influence on crop production and through the available food and water sources governs the distribution of livestock (Chatterjee, 1969). The ability of farmers to react to climatic adversity (Rosenberg, 1992) is substantial and has increased overtime. At the farm level, adaptive mechanism includes adjustments in planting and harvesting dates: changes in tillage practices, crop varieties, species, and rotations; fertilizer, herbicide, and pesticide applications; improvements in irrigation efficiency; and installation of new irrigation facilities (Parry and Carter, 1990; Reilly, 1996)

The conditions confronting Bangladesh as it became a new nation are well known and documented. Even then, it was one of the world's most densely populated and impoverished countries. It was characterized by: (1) extremely low per capita income and relatively high population growth; (2) a low literacy rate as well as a low level of general education; (3) a traditional agricultural technology as well as low agricultural productivity; (4) a small industrial base and few mineral resources;

(5) an inadequate communication, transportation, and power infrastructure, exacerbated by the country's extensive rivers and flood plains; and (6) a chronic balance of payment problem (Wennergren *et al*., 1984). Many observers have attributed Bangladesh's lack of food grain self-sufficiency to factors such as population growth, the failure to adopt appropriately modern agricultural technology, government interference with agricultural prices, inadequate financial institutions, or insufficient investment in irrigation facilities (Jannuzi and Peach, 1990). Bangladesh is a land scarce country where agriculture is the mainstay of the economy contributing over 22 per cent to its GDP (Quasem, 2008). In agrarian society like Bangladesh, more than 80 percent people are either directly or indirectly associated with agriculture. Due to tremendous population pressure, squeezing trend of agriculture land for other use and degrading of land fertility limit, possibility of more food production remains un-expectable for the rural people of Bangladesh. Poverty stands as a common phenomenon for the land less, marginal and small farmers. People of the study area are trying to develop through agricultural change. The beel area is popular for fishing to the country people. About 30 years ago agricultural change is found spontaneously. All of the people of the study area are directly or indirectly depend on agriculture. This dependency reflects on their different socio-economic activities. Their ultimate goal is to ensure food security themselves and contribute to country people as well. The qualitative differences are found between the developed and underdeveloped countries. Weitz (1971) says, "for the vast number of farm families, whose members constitute the main agricultural work force, agriculture is not merely an occupational or a source of income, it is a way of life." Agricultural change means the changing pattern of cultivation and rearing of agricultural sub-sectors. This change is occurring for people's awareness towards modernity. They are replacing their traditional production to modern. This is helpful for more production and new opportunities. Hossain (1989) rightly says, the growth of agricultural income may also increase the opportunity for investment and employment in non-farm rural activities through

its effects on the demand for such item as (1) irrigation equipment and other modern agricultural inputs produce in the non-agricultural sector, (2) services for processing and marketing additional surplus produce and (3) trade and transport service arising from the traditional purchase of non-farm products. More production helps to develop the producer class. Increased agricultural productivity enables farmers to grow more food, which translates into better diets and, under market conditions that offer a level playing field, into higher farm incomes. With more money, farmers are more likely to diversify production and grow higher-value crops, benefiting not only themselves but the economy as a whole"(Delang, 2006).

A decline in rice production will mean more people will slip into poverty and hunger. Due to tremendous population pressure, squeezing trend of agriculture land for other use and degrading of land fertility limit, possibility of more food production remains unacceptable for the rural people of Bangladesh. The farmers who are directly involved in various types of agricultural production becoming financially benefited and savings as well. They are cultivating generation to generation and change has been come in their cultivation process. Though agricultural production system has been developed but they have some problems and prospects on their production system like more and multiple crops production. They are using their surplus production in the development of occupational opportunities for themselves and their children as well. Tendency of children education is increasing day by day. Their housing pattern is improving and they are using their surplus value for purchasing housing and arable land. As a result land demand in terms of purchasing has been increased and most of the time purchasing and selling of land are conducting within the study area. Climatic impact like draught, dense fog, hailstorm and heavy rain are the major threats of agricultural change and production. Agro-ecological system is very important for agricultural production and change which is clearly decreased and playing negative role on agricultural change in the study area. Problems of agricultural change create negative impact on efforts to development in rural areas people due to low

production, poor income, poor opportunities and so one. On the other hand, prospects of agricultural change create positive impact on efforts to development in the rural people by more production, more income opportunities and so one. These are only common because of the dependency on agriculture of the rural people of Bangladesh.

We do not know and have no specific or definite scenario on the aforesaid sociological aspect to the development in rural areas. That is why this study will help to identify the problems and prospects of agricultural change on efforts to development in rural areas of Bangladesh.

1.6 Objectives of the Study

The main objective of the study is to explore the agricultural change and its relations with development in terms of problems and prospects in rural areas of Bangladesh. Besides this the following specific objectives are taken in the study which are-

i. to know the socio-economic condition in terms of development of the rural people.
ii. to know the land tenure system as well as ownership in the rural areas.
iii. to identify the nature of agricultural production and change .
iv. to investigate the nature of agro-ecological system.
v. to find out the impact of climatic on agriculture.

1.7 Hypothesis of the Study

The major hypotheses of the study are:

1. Agriculture production system has been changed in nature,
2. Agriculture production has been increased in the study area,
3. Income has been increased in the study area,
4. Savings has been increased in the study area,
5. Occupational opportunities have been created in the study area,
6. Tendency of taking education has been increased in the study area,

7. The nature of land tenure system as well as ownership has been changed in the study area,
8. Housing pattern has been developed in the study area,
9. Opportunities have been created in terms of development in the study area,
10. Agro-ecological system has been degraded in the study area,
11. Natural calamities creates obstacle in agricultural production.

1.8 Rationale of the Study

Agriculture is a key sector in most developing countries. It has a key role to play in enabling them to accomplish development goals, including self-reliance, growth, and equity. The agricultural sector plays a vital role in the economy of Bangladesh in terms of its contribution to GDP, employment generation, livelihoods and poverty alleviation (Mainuddin, *et al.,* 2011). Agricultural is an important human activity whose essentiality gives it an inevitable ethical dimension. This dimension includes human, animal, environmental, economic, social and political aspects (Zimdahl, 2000).

In Bangladesh, agriculture is the primary occupation and major industry of about half of the total employed population. Most employment is in the low-productivity, low-wage, informal sector (around 80 percent), with no job security and retirement benefits. Self-employed workers are the predominant group among males, and unpaid family workers among females. There is considerable underemployment, especially among females and in rural areas (Khuda, 2011). The production performance of the agricultural sector in Bangladesh, particularly the crop sector, has considerable bearing upon the rate and structure of poverty and malnutrition, the trade balance and the government fiscal position, and consequently upon the rate of growth of the Bangladesh economy as a whole (Hossain, 1991). Population growth is placing increasing pressure on land resulting in increasing number of rural landless and urban poor (Choudhury, 2008).

In Bangladesh most of the people live in the rural areas. They have very few opportunities to change their social status. Those who are engaged in agricultural

production are facing various problems like natural calamities, unavailable of crop cultivation materials, lack of knowledge, capital etc. But still rural people are cultivating agriculture from generation to generation. This study area is in the middle *Chalon Beel* of Bangladesh. The people of this area depend on agriculture. Once upon a time different types of crops like jute, paddy, aush, amon, mustard, sesame, wheat etc. were produce more. Now boro production is found more than others. So many reasons behinds this not to produce traditional crops. Their livelihood, future plan, daily needs all are maintained directly or indirectly through agricultural production. At present, different types of occupations are found in the study area which is based on agriculture. So, if we want to understand the problems and prospects of agricultural change on efforts to development in rural areas, this place is the best place. This study will also help to know how rural people especially *Chalon Beel* areas faces and overcome the obstacles and develop in different sociological aspects. This research finding will be helpful to the policy maker for the development of agriculture through identify the problems and prospects of agricultural change and its relation with development in rural areas as well.

1.9 Organization of the Study

The present study is organized in nine chapters on the basis of its objectives. The first chapter is **Introduction** of which includes background of the Study, History of Agriculture, Agricultural Revolution: Neolithic Revolution, The Arab Agricultural Revolution, The British Agricultural Revolution, Green Revolution; Statement of the Research Problem, Objectives of the Study, Hypothesis of the Study, Rationale of the Study, Organization of the Study, Justification of the study, Limitations of the Study and Summary. The second chapter is **Review of the Related Literature and Conceptual Framework** of which includes Introduction, Review of the related Literature in Bangladesh and Abroad, Conceptual Framework, Theoretical Framework, Theory of Agricultural Change, Development Theory and Summary. The third chapter is **Research Methodology** of which includes Introduction, Study

Area: Demography, Population, Economic Condition, Social Class, Communication System, Education System, Religion, Recreation; Techniques of Data Collection: Primary Data, Sampling, Secondary Data; Analysis of Data, Agro-ecological Zone, Operational Definition of the Concepts: Agriculture, Agricultural Change, Development, Rural Development, Problems, Prospects, Household, Food Security and Summary. The fourth chapter is **Socio-Economic Structure** of which includes Introduction, Age, Religion, Marital Status, Occupation, Problems and Prospects of Taking Occupation, Education, Problems and Prospects of Taking Education, Members of the Households, Head of the Households, Age of the Households members, Occupation of the Households members, Education of the households members, Problems and Prospects of Taking Children's Education, Drop Out the Children, Forms of Family, Types of Housing, Income, Problems and Prospects of Increasing Income, Expenditure, Savings and Summary. The fifth chapter is **Land Tenure System** of which includes introduction, Land, Problems and Prospects of Achieving Land, Pattern of Land Ownership, Problems of Land ownership, Mortgage System, Problems of Mortgage System, Lease System, Problems of Lease System, Forms of Land Ownership, Problems of Land Ownership in Agricultural Development, and Summary. The sixth chapter is **Agricultural Production and Agricultural Change** of which includes Introduction, Arable Land of the Respondents, Change of Ownership, Pattern of Cultivation 20-50 Years Ago, Cultivation at Present, Cultivation Method, Use of Agricultural Tools, Getting Rice in a Year, Use of Rice as Food, Irrigation System, Problems and Prospects of Irrigation System, Problems and Prospects of Seeds, Use of Fertilizer, Problems and Prospects of Using Chemical Fertilizer, Use of Pesticides, Problems and Prospects of Using Pesticides, Changing Pattern of Crops Production, Problems and Prospects of More Production, Risk and Its Mitigation of Agricultural Production, Opinion in the Development of Agriculture, Social Status Due to Agricultural Production and Summary. The seventh chapter is **Agro-Ecological System** of which includes Introduction, Qualities of Soil, Soil Testing,

Useful Insects or Animal, Present Scenario of Useful Insects or Animal, Causes of Decreasing Birds in Agricultural Field, Birds in Season, Fertility in terms of Same Crop Production, Impact of Irrigation on Agro-ecology and Summary. The eighth chapter is **Impact of Climate on Agriculture** of which includes Introduction, Impact of Climate on Crop Production, Negative Impact of Climate on Crop Production, Impact of Climate on the Expenditure of Crops Production, Impact of Climate on Crops Preservation, Impact of Climate on Crops Marketing, Impact of Climate on Food Habits, Impact of Climate on Work/Labor, Negative Impact of Climate During 20-50 Years Ago, and Summary. The ninth chapter is **Qualitative Data Analysis** in which includes Introduction, and Summary. Another is Conclusion. References, Appendix-i: Questionnaire, Appendix-ii: Check List, Appendix-iii: Maps are also included in this thesis.

1.10 Justification of the Study

Agricultural study is not new one in Bangladesh. Many other discipline studied agricultural issues in their own perspectives. These studies are widely done after the 'Green Revolution'. In this study, a number of documents like books, journals and reports on the relevant field both home and abroad are reviewed. Most of the studies are conducted individually and few on institutionally on the issues of impact of green revolution, nature of agricultural production, impact of climate on agricultural production and so one. But these studies were not sufficient for unfolding the problems and prospects of agricultural change on efforts to development in rural areas of Bangladesh. The studies which were completed individually and institutionally, that were much inadequacy in sociological research methodology, analysis, techniques, findings and appropriate content of the study. This study has been tried to fulfill the research gap and made new ideas on the problems and prospects of agricultural change on efforts to development in rural areas of Bangladesh.

1.11 Limitations of the Study

There are few limitations in the study that face during the study period. Firstly, in sociological study researcher have to ask questions to the men who think about gain or loss for answering questions that make obstacle to complete in time and create absurd situation in the interviewing period. Secondly, asking single respondent many respondents attend that time and become interested answer the questions at a time that sometime make same answer of the respondents. Thirdly, some one are not interested to express their total land due to unknown causes. Later on it is identified that they think it will help to the share holders that may take their parts. Fourthly, most of the time respondents think how could researcher helps them that some how become common desire by the all. Fifthly, secondary source like books, journal might be reviewed more. Finally this study might not be represented of the all rural areas of Bangladesh due to different geographical condition or other reasons but will be helpful to the new research and others who are involved in agricultural activities. From the above limitations, it is tried to collect data accurately by dint of clearing the objectives of the study to the respondents and then they become more interested to answer the all questions spontaneously. Moreover, they deliver additional data that helps to enrich the study as well.

1.12 Summary

Bangladesh is a developing country. Most of the people depend on agriculture. Agriculture was as such a way of living in ancient period. No overstepping is found at present circumstances. Agriculture was developed at least ten thousand years ago and helps to develop the civilization. Before Green Revolution another three agricultural revolutions like the Neolithic Revolution, the Arab Agricultural Revolution and the British Agricultural Revolution are found that improve the agriculture and help the development the civilization. Modern agriculture is almost the results of Green Revolution. In the study area, most of the people directly or indirectly depend on agriculture. They are facing many problems in their agricultural activities but still they are trying to develop themselves by their

agricultural production. By this study, it will be possible to explore the agricultural change and its relations with development in the rural areas of Bangladesh. This research finding will be helpful to the policy maker for the development of agriculture through identify the problems and prospects of agricultural change and its relation with development in rural areas as well.

CHAPTER – TWO

REVIEW OF THE RELATED LITERATURE AND CONCEPTUAL FRAMEWORK

2.1 Introduction

Bangladeshis is predominantly a rural society with more than 90 percent of the population living in about 65000 villages. But very little systematic work has been carried so far on the social, economic and political relations at the village level, and these remain largely unpublished, and so are not readily accessible to those who might be able to use them to good advantage (Chowdhury, 1982). Several influential rural studies in the 1970s had observed that the agrarian structure would constrain the development forces in Bangladesh agriculture (Van Schandel, 1976; Januzi and Peach, 1980; Boyce, 1987). Moreover those who studied various issues on rural life of which Bertocci (1970), Abdullah *et al.* (1976), Jahangir (1976), Wood (1976), Arens and Beurden (1977), Adnan (1977), Chowdhury (1978), Hossain (1978), Westergaard (1978), Alamgir (1978) Howes (1979) are mentionable. They analyzed on the mode of production, rural class relationships, agriculture structure, agro based class structure, agricultural discrimination, increase of agricultural labor price, political power and social mobility of peasant society.

2.2 Review of the Related Literature

The literature is reviewed in two sections. First section, Bangladeshi research and literature and second section besides Bangladeshi or abroad literature regarding agricultural nature, change and activities are analyzed for identifying the research gap in the study.

2.2.1 Review of Related Literature in Bangladesh

Asan (1964) in his book *Productivity and Social Environment* Attempts to establish relationships to raise agricultural productivity-both in yield per acre as well as in production per person employed. This is done through irrigation schemes, better farming methods, and so on. As a result of all these measure, it is hoped that productivity will increase on the one hand and potentialities of employment will lead to a higher standard of living for our vast and growing population. He also mentioned education has a crucial role to play both in productivity and in social environment... Education is a means of influencing and changing the social environment- usually for the better. Economic growth and productivity are also related to the educational level of a society. He did not mention education as developmental indicators depends on agricultural change and production as well.

Evenson and Kislev (1975) in their book *Agricultural Research and Productivity* said, recent developments in agriculture have been characterized not only by increased use of resources-land, fertilizers, water, and machinery- but also by increasing productivity. From the same set of inputs farmers have been receiving increasing amounts of output. These productivity gains are due to improved quality of the factors of production, better knowledge, and better infrastructure and institutional arrangements. They mentioned the nature of agriculture but did not mention the problems and prospects of agricultural change.

Sidhu *et al.* (1982) in their book *Agricultural Production, Fertilizer use, and Equity Considerations* mentioned the use of chemical fertilizer in Bangladesh. They mentioned in recent years there have been considerable increases in the use of chemical fertilizers and other modern inputs in Bangladesh agriculture. The use of chemical fertilizers in Bangladesh started in the late 1950s and had become fairly well established by the mid 1960s. They mentioned the using pattern of chemical fertilizer but did not mention the impact of chemical fertilizer that either problems or prospects of agricultural change and its relation with development.

Wennergren *et al.* (1984) in their book *Agricultural development in Bangladesh* said agriculture is clearly the most important employer of labor in the economy of Bangladesh. They mentioned the social classes on the basis of land and said there are three classes of land ownership in Bangladesh: (1) those who hold homestead land only for their homes with no cultivable lands; (2) those who own and cultivate their own lands and take in leased lands; and (3) those who own land but lease it to someone else for cultivation. A forth category of relevance to the tenure structure are those rural residents who own neither homestead nor cultivable land. They did not tell, what are the impacts of aforesaid classes in agricultural production and developmental activities?

Rahman (1986) in his book *Peasant and Classes: A Study in Differentiation in Bangladesh* said, the mid-1960s saw the beginning of the Green Revolution in rural Bangladesh. The war of liberation in the early 1970s brought many changes in rural Bangladesh. The first post-liberation government announced a new reform bill. More modern agricultural inputs were made available to the farmers. The use of mechanized pumps for irrigation started in the early sixties. Along with the expansion of irrigation facilities the use of high-yielding (HY) seeds of paddy and wheat also increased. The use of HY seeds for *Boro* and *Aman* started in the mid sixties. He mentioned the use of chemical fertilizer in Bangladesh Agriculture started only in 1962/63. The consumption of fertilizer increased even at a faster rate in the seventies. The impact of Green Revolution is found still today but it is essential to know the problems and prospects of agricultural change and its relation to development.

Hossain (1988) in his book *Nature and Impact of Green Revolution in Bangladesh* said Bangladesh has experienced some progress in the use of modern agricultural inputs over the last 25 years. Irrigation, along with flood control and improved drainage, facilitated the spread of modern-input responsive MVs which now cover about one-fourth of cropped land and one-third of sown area under cereal crops. The majority of the people continue to depend on land for their livelihood because

of limited expansion of nonagricultural sectors. Irrigation has a significant effect on increasing the effective supply of land during the boro season. Technological progress increases the demand for labor in the agricultural sector. Technological progress is the key to overcoming the land constraint to growth of food grain production in Bangladesh. Sometimes technological progress decreases the labor that he did not mention earlier. On the other hand development of the rural poor depends on the problems and prospects of agricultural change that he did not mention and analyze in his book.

Parthasarathy (1988) in his book *Agricultural Growth, Rural Development and Poverty* mentioned a more recent text book on the economics for a developing world devotes a whole section to the concept of rural development and identities three aspects: (1) improvements in levels of living, including employment, education, health and nutrition, housing, and variety of social services, (2) decreasing inequality in the distribution of rural incomes and in rural-urban balances in incomes and economic opportunities, (3) the capacity of rural sector to sustain and accelerate the pace of these improvements. Even in this definition the equity aspect of development is crucial. These are the some indicators of development and how are affected by the problems and prospects of agricultural change are not clear in his book.

Huq *et al.* (1990) in their article "*Environmental Aspect of Agricultural Development in Bangladesh"* said, crop production in Bangladesh in recent years has undergone some changes in terms of yields as well as crop distribution, increase in overall production has been achieved mainly from improvements in crop yields of wheat and rice and due to the adoption of high yielding varieties of these crops along with irrigation and fertilizer use. They added regarding environmental problems that agriculture in Bangladesh is faced with a number of environmental problems some of which are recurrent; such as floods, draughts and cyclones while others are more long term and incremental such as deforestation, decrease in water availability and increasing salinity. They mentioned the nature of agricultural

change and risk but did not mention the prospects of agricultural change and its relation with development in the rural areas.

Jannuzi and Peach (1990) in their article *"Bangladesh: A Strategy for Agrarian Reform"* the differences between land owner and landless. They mentioned landowners are better fed, better educated, live in better housing, and live healthier and longer lives. They have easier access to credit and are likely to have more power and prestige than the landless. The landless are generally at the bottom of the income distribution. Moreover, the landless are also unlikely to be the direct beneficiaries of development programs designed to increase agricultural productivity. Agricultural production is almost depending on nature that may helpful or harmful that are ignore in their study. So, agricultural change as well as production can play the significant role on developmental efforts in the rural areas.

Hossain (1991) in his book *Agriculture in Bangladesh: Performance Problems and Prospects* said, there are no immutable reasons for Bangladesh to remain content with growing less than 1.5 tons of rice per hectare, even though our soils are among the most fertile in the world while Japan and Taiwan are able to grow 4 tons, Egypt 308 tons. Even the rice growers of Malaysia, Srilanka and some province of India obtain more than 205 tons of rice per hectare of land. It is generally held that we should be able to attain levels of productivity closer to those achieved in other developing countries. He added, in the flood free areas of Bangladesh it is possible to grow three crops a year. Of the 8 million hectares of land which are under cultivation, two crops can be grown in nearly 4 million hectares despite some flooding. The total gross cropped area under rice cultivation works out to about 10 million hectares but the total output of rice in the mid-eighties was a little more than 15 million tons only. He also mentioned that Bangladesh with a humid subtropical monsoon climate is suitable for the growth and cultivation of a wide variety of tropical and subtropical crop species. The cropping pattern depends on a number of factors such as climate (rain fall, temperature and light), topography of soil, soil condition, etc. Moreover he mentioned, Mechanized irrigation, chemical fertilizer,

pesticides and HYV-seeds, all were 'modern' inputs in Bangladesh agriculture introduced 'from outside'. Agricultural inputs are important to increase agricultural production and in many areas it is possible to produce multiple crops. But he did not discuss the problems and prospects of agricultural change and its impact on development.

Hebbar (1993) in his book *Integrated Rural Development Programme: Retrospect and prospect* said, rural development is a process. This process can be facilitated with the interest, initiative and active participation of the people in rural areas. The external agents including government agencies are to create a conductive environment for facilitating this process. Some of the ingredients of this environment are education and training of rural people to create awareness in them about the need for development, to handle the new situation and technologies with confidence, to expose them to better practices and make available the necessary inputs including financial infrastructure.

Younus (1993) in his article "*Farmers Response to Price in Bangladesh*" said, his study provides a comprehensive analysis of acreage response to price of crops in Bangladesh. The range of elasticity estimates obtained is not contrary to *a priori* expectations, The price elasticity estimates for cash crops, viz jute tobacco, cotton, and sugarcane are relatively high as one would expect. Among the rice crops, the price elasticity of *Boro* is also higher. This suggests that *Boro* is not cultivated to meet farmers' subsistence needs. The high magnitudes of price elasticity estimates of some crops suggest that there is some scope, *albeit* restricted, of using price policy to increase production. Crops price is important for the development of the rural people. It is also related with the production rate per acre. He did not mention the role of price on development and role of agricultural change on development.

Zohir (1993) in his article *"Problems and Prospects of Crop Diversification in Bangladesh"* said, Growth in Bangladesh crop sector, for more than a decade now, had been sought through expansion of acreage under modern variety *boro.* Such expansion had been facilitated by provision of modern irrigation. It is now well

recognized that the expansion has not always been into areas where no dry season crop was previously cultivated. Rather, crop substitution within and across seasons had been more commonly observed; even to the extent of reducing cropping intensity. All evidences, presented in the previous section, suggest that expansion of acreage under modern variety *boro* will inevitably lead to a less diversified crop economy, and, more often, a lower cropping intensity. The evidence had also indicated that areas newly brought under mechanized irrigation were more likely to be occupied by MV *boro*. He mentioned the prospects of MV boro but did no mention the developmental issues in terms of agricultural change.

Mandal and Dutta (1993) in their article *"Irrigation for Crop Diversification in Rice-based Systems in Bangladesh"* said, the most important reason for farmers to increase the production of non-rice crops, specially irrigated potato and vegetables, is due to higher returns from these crops, compared to irrigated rice production in the Rabi season. The findings from Chandina and Jhenidah, the two locations where diversified crops are grown under irrigated condition, Show that the returns from irrigated potato and vegetables are, in general, significantly higher than irrigated HYV *Boro* or irrigated HYV T Aus. Wheat, which competes with HYV Boro, was a losing concern in both areas. He did not mention what are the reasons behind the higher return from the non-rice crops and, what are the problems and prospects of agricultural change as well as rice crops because still rice is the staple food of Bangladeshi people.

Metzel and Ateng (1993) in their article *"Constraints to Diversification in Bangladesh: A Survey of Farmers' Views"* mentioned, the concept of crop diversity is illusory because it incorporates two distinct ideas. First, crop diversity is assumed to increase with the number of different crops. In the case of Bangladesh, farms may be expected to have large number of different crops, particularly in the homestead gardens. However a second concept relates to the relative importance of each crop in production. A more diversified farm is one which does not depend too heavily on any single crop. Moreover they also mentioned that the survey results

suggest that farmers already produce many non-rice crops both for consumption and sale and are aware of many opportunities. They did not mention the role of opportunity on development.

Zohir (1995) in his book *Bangladesh Strategies for Development* said, more recently significant changes have been observed in the food and agricultural sector, and there is optimism in many quarters regarding the country's prospect of attaining self-sufficiency in food grain production. He added that much of the growth in the crop sector has been due to growth in rice production which may be explained by increased adoption of high yielding varieties (HYV) in all three rice season (Aus, Aman and Boro). He mentioned the change in the agricultural sector but did not mention what are the problems and prospects of agricultural change and its relation with development.

Alam and Abedin (1996) in their article *"Changing Cropping Pattern in Bangladesh from 1971-75 through 1991-93: Implication on Crop Sector Growth"* said that over the past 25 years after the independence of Bangladesh, Cropping pattern in agriculture has shifted towards cultivation of traditional rice crops to modern variety of rice crops together with profitable non cereals and other cash crops like vegetables. They also indicate that cropping pattern has changed towards HYV boro and amon rice varieties during the nineties which indicates that HYV boro rice while contributed about 57 percent of the cropped area. They did not analyze the problems and prospects of agricultural change and its relationships with development in the rural areas.

West (2002) in his article *"Food and Agriculture in Bangladesh: A Success Story"* said, the rice production in Bangladesh started to increase significantly in the late 1970s because of an expansion of HYV Boro rice farming largely with public sector investment on irrigation. Subsequently, irrigation investment by the private sector helped for expansion of HYV rice farming since the early 1980s. Meanwhile, the development of rice farming in Bangladesh was considered as a success story of green revolution. The author of the article analyzed the impact HYV boro rice

farming as well as the green revolution but did not discuss the problems and prospects of the impact of green revolution in the agricultural change.

Annual Research Review of Bangladesh Rice Research Institute (2005), Rice economy of Bangladesh essentially faces the following challenges: (i) growing competition with cash crops due to increase in the cost of rice production and (ii) increase in competition in the international market. Costs of rice production at the farm level increased in all three seasons during the period of 2001 to 2005. Although gross returns have increased due to increase in yield, the gross margin tended to decrease because of rice in production cost. In this reports it has been mentioned that there are some challenges in the agricultural production but has not yet been mentioned the prospects of agricultural change and what type of effects on development in the rural areas.

Alauddin (2005) in his article *"Agrarian Change, Sustainable Resource Use and the Rural Environment in Bangladesh"* said, Bangladesh agriculture achieved significant production transformation. The process is underpinned by the use of ago-chemicals, ground water irrigation and increased incidence of multiple cropping. Food grain production has more than doubled over a period of three decades since independence. It has primarily has supported Bangladesh's large population base rather than enhancing the living standards of the average Bangladeshi. He also added the introduction of the new agricultural technology has led to a considerable increase in water use for production of agricultural crops. Production transformation and multiple crops production imply the change of agricultural production but did not mention the problems and prospects of such agricultural change that are the factors of development in the study area.

Rahman (2005) in his article *"Environmental impacts of technological change in Bangladesh agriculture: farmers' perceptions, determinants, and effects on resource allocation decisions"* measures the impact of modern technology adoption in raising farmers' environmental awareness and the impact of farmers' environmental awareness on resource use by utilizing survey data from 21 villages

in three agro-ecological regions of Bangladesh. Results reveal that the "level" and "duration" of involvement with modern technology raises farmers' environmental awareness, and that farmers' environmental awareness reduces resource use including chemicals. Farmers, who are aware of the adverse environmental impacts of modern agricultural technology, use lower amounts of all inputs in order to avoid further environmental damage. Therefore, efforts to raise farmers' environmental awareness are expected to enhance intangible benefits accruing from a relatively less chemical-intensive environment. He emphasize on the awareness of the rural farmers that may save their agricultural production but did not mention the relation of development in the rural areas.

Talukder (2005) in his article *"Food Security, Self-sufficiency and Nutrition Gap in Bangladesh"* said, instability is another major feature of the food security situation in the country. Because o floods, draughts, cyclones and other natural calamities, national agricultural production varies from year to year. At the village and household levels availability is aggravated by annual variation in purchasing power, with the consequence that household food security is very unstable. He also added however, there are prospects of Bangladesh's crop agriculture being turned into a diversified one with increased production of high value non-rice crops, both for domestic market and exports. The fundamental spirit of food security is to ensure availability and consumption of food at individual level. He analyzed on important issue food security is on of the burning issue and some problems or risk of food production but did not mention the prospects of food production that have significant relation with the development of rural people.

Mishra and Hossain (2005) in their article *"Current Food Security and Challenges: Achieving 2015 MDG Hunger Milepost"* said food security situation in Bangladesh has improved, especially on the availability side, and further improvements on access and utilization, to be sustainable and government, civil society (including media) and in food security can not be overemphasized given the country's low income, recurrent natural calamities and increasing international

prices of food commodities. They mentioned few problems and prospects of food security but did not relate with the agricultural change and development.

Rahman and Khan (2005) in their article *"Food Security in Bangladesh: Food Availability"* said, food availability is one of the three conditions of food security as defined in the world food summit. The other two conditions are access and utilization. Food grain production, particularly rice production has doubled in the last two decades with the use of Green Revolution technology (high yielding varieties, fertilizer, irrigation and pesticides) coupled with growth of institutional infrastructure and a positive shift in public policy and market forces. Remarkable progress has been made in rice production during the last ten years. In 1994-95, rice production was 16.83 million tons, which has steadily increased to 26.19 million tons in 2003-04. They discussed on the impacts of Green Revolution on agriculture that imply some sorts of prospects but did not mention the major problems of such revolution that play role on agricultural change and development as well.

Rukuni (2006) in his article *"The Green Business"* said agriculture plays several traditional roles essential in overall economic growth. He includes: (a) providing adequate and affordable food for increasing populations. The process of industrialization and urbanization is more efficient when food is more affordable for the growing industrial labor force, (b) supplying raw materials to growing and diversifying domestic industrial sectors. This more crucial at earlier stages of industrial development, but it is still important, if less visible, even for industrialized nations, (c) releasing labor for the growing industrial sector. The ideal is to have as much rural employment as possible at lower stages of industrialization. As an economy industrialized, the countryside can efficiently release more labor to urban-industrial complexes. Ideally these migrants are better prepared for urban- industrial living first equipped with some life and business skills, (d) enlarging the size of an effective market for the products of the domestic industrial sector. Since it takes time for the urban-industrial sector efficiently to absorb the rural labor, agriculture has to continue to thrive. The more disposable

income available to rural households, the grater the demand for manufactured goods and services for the growing economy, (e) providing employment and livelihoods, and alleviating poverty, for a large percentage of the rural population. Evidence shows that it is an important to create rural jobs as urban ones in poor nations. Rural jobs are vital to slow down premature urban migration, propelled by rural poverty and lack of economic opportunity, (f) earning saving foreign exchange. This is one of agriculture's most important roles in developing countries. As demand for imported goods and services rises, agriculture is often critical for the balance of payments, both through its exports, and through innovations that allow nations profitably and efficiently to grow substitutes for imports, and (g) accumulating domestic savings for investment and capital formation. The more prosperous the agricultural and rural sector, the more people can save money, paving the way for a thriving banking sector that can finance further industrial development without relying unnecessarily on foreign debt. The author almost discussed the developmental impact of the agriculture in the rural areas yet, did not mention the problems of achieving aforesaid developmental indicators.

Bodker *et al.* (2006*)* in their book *Seed Sector Country Profile: Bangladesh* said, it is estimated that the agricultural land is declining by around 1% per year and the land quality is deteriorating due to degradation, soil fertility problems, soil erosion and soil salinity. In average, Bangladesh is losing good quality agricultural land by approximately 80,000 ha annually due to urbanization, building of new infrastructure such as roads and implementation of other development projects. In order to produce more food for the increasing population, growing at the rate of about 1.6 per year, there is a call for increase in agricultural growth through higher productivity, including increased yields, agricultural intensification and/or diversification and value addition. They nicely discussed some problems and few prospects of agricultural production as well as agricultural change but did not discuss how it effects on development in the rural areas of Bangladesh.

Watson *et al.* (2006) in their article *"Understanding the Future"* said, agricultural intensification can substantially improve and increase productivity, but it can also have severe environmental consequences. Introducing high-yielding varieties can lead to the erosion of genetic diversity: changes in land cover and agronomic practices can result in soil erosion, and thus loss of essential nutrients and decreased water-holding capacity: pesticides may kill pollinating insects and natural enemies of pest and diseases: application of agricultural chemicals can contaminate surface and ground water: and intensification can result in increased greenhouse gas emissions, such as methane and nitrous oxide. They analyzed very important issue like problems of agricultural production and change but did not mention the effects on development.

Kashem *et al.* (2007) in their article *"Effect of Green Manuring Crops in Different Rice based Cropping Patterns on Soil Fertility under Irrigated Ecosystem"* mentioned the crop production in terms of soil fertility. They said intensive and continuous rice-based crop culture, replacement of local rice varieties by modern ones, decreasing jute cultivation, increasing adoption of power tillers for tillage operations and increasing use of dung and organic waste as fuel have been relatively affecting that status of soil organic matter. Increased cropping intensity and sustained productivity of the soil are the important options to achieve self-sufficiency in food. Sharp declining in soil fertility is a threat for sustainable crop production. They analyzed the problems of agricultural change but did not mention the prospects and effects on development in the rural areas.

Razzaque and Hossain (2007) in their *country Report on the State of Plant Genetic Resources for Food and Agriculture: Bangladesh* said, Bangladesh agriculture is gradually transforming from the subsistence production system to commercial agriculture. Under the traditional subsistence farming practices, the farmers produced crops mainly for household consumption and the surplus, if any, was sold in the market. The importance of traditional cash crops (jute, sugarcane, tobacco etc.) of Bangladeshi farmers has diminished with time of necessity, farmers

are now turning towards food crops like rice, wheat fruits and vegetables for commercial production and for cash earning. They discussed on the cropping pattern or production nature but did not discuss of the effects on development.

Iglesias *et al.* (2007) in their book *Adaptation to Climate Change in the Agricultural Sector* said the main risks to agricultural production imposed by climate change. These include risks resulting from changes in: water resources and irrigation requirements; agricultural pests and diseases, soil fertility, salinity and erosion, crop growth conditions, crop productivity and in crop distribution, optimal conditions for livestock production, land use and increased expenditure in emergency and remediation actions. They rightly pointed out the risks of agricultural production and change as well but did not point out the prospects and developmental impact of agricultural change.

Robbani *et al.* (2007) in their article *"Agriculture in Bangladesh-Rent Trend and Agro environment toward Sustainability"* said, Bangladesh agriculture is now in the process of transformation from subsistence farming into commercial farming. They mentioned some opportunities in the agricultural sector. These are (i) agriculture sector is the single largest contributor to GDP, (ii) crop production system is highly labor intensive and there is an abundance of labor in the country, (iii) agriculture is the largest source of employment for skilled and unskilled labor, (iv) favorable natural environment generally exists through out the year for crop production, (v) wide range of bio-diversity exists for different crops, (vi) agricultural commodities are the main sources of nutrition including protein, minerals and vitamins, (vii) agricultural commodities have comparatively higher value addition than non-agricultural commodities. They also mentioned some constraints in the agricultural sector. These are (i) agriculture is dependent on the vagaries of nature and is risky, (ii) availability of cultivable land's decreasing, (iii) widespread poverty among the population engaged in agriculture, (iv) lack of required capital for agricultural activities, (v) inadequacy of appropriate technology considering farmers socio-economic conditions, (vi) uncertainty of fair price of agricultural commodities due

to underdeveloped marketing system, (vii) agricultural commodities are rapidly perishable and post harvest losses are too high, (viii) limited knowledge of common people about the nutritional value of agricultural commodities including vegetables and fruits. Moreover they said using agro chemicals has become essential inputs for the cultivation of HYV rice and other crops. They mention some opportunities and threats of agricultural change in Bangladesh but did not mention the how effects these opportunities and threats on the development of rural areas.

Akanda (2008) in his book *Process of Agricultural Development in Bangladesh: Field studies on the Impacts of evolving Policies and Land Ownership on the development of crop Farming* said rice farming developed remarkably with an expansion of irrigated HYV Boro rice farming. Bangladesh inherited a crop sector dominated by rice cultivation. The strategies of agricultural development were centered to the growth of rice production. Bangladesh agriculture is often affected by natural calamities like floods and draughts. There were severe famines in 1770, 1866 and 1896 in greater India including Bangladesh due to hampering of crop productions during natural calamities. He mentioned the natural impact on agricultural production. He did not mention the developmental issues of agricultural production.

Choudhury (2008) in his book *Land Use Planning in Bangladesh* said Bangladesh has made significant socio-economic progress since independence in 1971 despite adverse circumstances and its vulnerability to natural disasters. The country has almost achieved food self sufficiency, and has made considerable progress in poverty alleviation, expansion of education and health services, raising average life expectancy from 58 years in 1994 to 64.9 years in 2003. He added the primary objective of land use planning in Bangladesh should be to ensure optimum use of land and water resources in the coming decades to maintain a high quality of life despite the rise in population. He also said agriculture will have to be treated as a priority sector for many reasons. Agricultural sector supplies food, and provides employment on a large scale and also provides fuel. Our agricultural practices

suffer from many constraints. Traditional agricultural practice continue although modernization has started albeit slowly. Pest infestation is a major problem. Natural calamities are common and agriculture is greatly dependent on nature's bounty. There are problems of irrigation quality seed, and fertilizer. Farmers can not make proper marketing of their products. Soil fertility is declining every year due to abuse and over use of land for deficiency of organic matters, water logging and lack of nutrients. He mentioned almost major problems and prospects of agricultural production and change but did not analyze the effects on development.

Freema (2008) in his article *"Designing Improved NRM Interventions in Agriculture for Poverty Reduction and Environmental Sustainability in Developing Countries"* said, climate change remains a continuing threat to livelihoods in the developing world, and its impact on vulnerability and poverty is likely to be considerable in places where for their livelihood. The remarkable growth in agricultural productivity in much of the developing world has taken place in more favored agricultural systems, both irrigated and rainfed, with high production potential, good market access, and adequate provision of key public goods such as roads and agricultural support services. In these systems agricultural growth has been driven largely by intensive use of land, irrigation, fertilizer, and other agrochemicals and is often supported by strong government policies. He did not mention the problems and prospects of agricultural change even its relation with development in the rural areas.

Quasem (2008) in his book *Development Strategies and Challenges Ahead of Bangladesh* said, rice is the main crop of Bangladesh, growing over three fourth of cultivable land. Its yield per hectare is low (2.50 ton) but increasing slowly. Green revolution strategy pushes towards rapid diffusion of high yielding varieties of food grains, notably rice and wheat. It is concerned with increasing food production, which would have direct impact on problems related to famine, hunger and poverty. Increasing more production is helpful to mitigate the food crisis of the domestic

level and country as a whole. He did not discuss the challenges and opportunities of green revolution that is related with development in the rural areas.

Akanda and Ito (2008) in their article *"Evolution of Land Ownership and its Market in Rural Bangladesh –Case Study of a Selected Clan in Krishnapur Village, Sherpur District"* said, the changes in land ownership and land market during 1900 and 2004 were divided into three phases. The 'reckless creation of inequality under deceptive land market (1900-1965)' phase was characterized by an increasing inequality with creation of all types of farmers. Large and medium farmers even sold due to improved eating habit, multiple marriage, reckless migration, addicting to folks, etc. The reaching to average distribution under distressed land market (1966-190) phase was characterized by reaching to a level of inequality with non-farm households. Many medium and small farmers were found to selling land irrationally for inheriting extravagant eating habits, facing natural hazards and badly in needed conditions. The last phase, 'improving ownership under discreet land market (1990s and thereafter)', was characterized by almost an unchanged level of inequality with rational land transactions where, households had a very high tendency of holding land. They did not mention in which class and why is purchasing the arable land.

Akanda *et al.* (2008) in their article *"Problems of Sharecrops Tenancy System in Rice Farming in Bangladesh: A Case Study on Alinapara Village in Sherpur District"* said, the HYV Boro rice farming in the dry season had increased because suitable soils needed relatively limited irrigation. Rice productivity was highest for the large farmer because of using new seeds and taking great care of a small area of owned land. They did not discuss the causes why not of using new seeds and taking grate care by the others farmers besides large farmer. On the contrary they did not mention the problems and prospects of agricultural change and production as well. These problems and prospects have effects on the rural development that are also important to find out the study.

LaSalle *et al.* (2008) in their book *The Organic Green Revolution* said, conventional Green Revolution practices using petroleum-based and chemical inputs have been shown to cause continual loss of soil nutrients, soil organic matter and food nutrient content. These practices consume vast quantities of natural resources to prepare, distribute, and apply fossil fuel inputs, and can justify be defined as degenerative farming with increased population pressures and declining ecological support systems of healthy soil and water, the only sustainable and restorative option available is one based on the biologically-enhancing production models of organic farming. They discussed the problems of green revolution but did not analyze the prospects of green revolution. This is very important to identify and measure the developmental issues in the rural areas of Bangladesh.

Alam (2009) in his book *Impact of Diversified Agriculture on the Socio-economic Upliftment of the Rural People of Bangladesh* said, the farmers are poor, and their livelihood is very much dependent on agriculture, so they are aware of keeping their family size small as a strategy of survival in a different socio-economic phenomenon like poverty. He also mentioned diversified crops are more profitable than cultivation of rice. He mentioned that the negative trend of diversification was due to impact of structural adjustment policies in the name of withdrawal of subsidies from fertilizer, insecticides, and irrigation equipments. His study findings revel that diversified agriculture in terms of crop frequency can be increased by socio-economic variables like family size, age of household head, education of family head, ownership of land, operational holding and also income from agriculture. He also added that marketing problems are the important barriers for upgrading diversified agriculture in rural Bangladesh. He clearly mentioned the nature and causes of agricultural diversification but did not mention its impacts or effects on development in the rural areas.

Wani *et al.* (2009) in their article *"Rainfed Agriculture- Past Trends and Future Prospects"* said the agricultural productivity has seen a rapid growth since the late 1950s due to new crop varieties, fertilizer use and expansion in irrigated

agriculture. The world food production outstripped the population growth. The importance of rainfed agriculture varies regionally but produces most food for poor communities in developing countries. The majority of poor in developing counties live in rural areas: their fair and equitable access to productive resources. They did not mention the impacts of rapid growth of production either in agricultural change or development in the rural areas.

Mondal (2010) in his article "Crop Agriculture of Bangladesh: Challenges and Opportunities" mentioned crop agriculture in Bangladesh is constrained every year by challenges, such as a) Loss of Arabie Land, b) Population Growth, c) Climate Changes, d) Inadequate Management Practices, e) Unfair Price of Produces, and f) Insufficient Investment in Research. He also mentioned in Bangladesh, about 80,000 ha of arable land are going out of production every year. The loss is alarming and needs to be addressed immediately. The land use policy of the government should be updated and implemented immediately to stop further loss of arable land. Another problem to agriculture is the increase in the growth of population. The twin problem of arable land loss and population growth needs to be addressed simultaneously to ensure sustainable crop production. Country's crop production is also affected frequently by flood, drought, and salinity. After analysis he draws some recommendations that varieties/technologies tolerant to these natural hazards need to be developed. Renewable energy, reduction in the use of fossil fuels, and a forestation are recommended to mitigate the adverse effects of climate change. To sustain crop production, chemical fertilizers must be integrated with organic manure and costly non-urea fertilizers should continue to be subsidized. He emphasized on various challenges and means of development in agricultural production in his study. These challenges are also common in different areas in our country. Any challenges in agricultural sector helps to reduce production which threats in food security. Sustainable agriculture is possible through challenge free environment yet, it also face by agricultural development in the respective areas in

the country. He did not mention the prospects of agricultural change and developmental issues in rural areas.

Hossain and Bayes (2010) in their book *Rural Economy and Livelihoods: Insights from Bangladesh* they analyze mostly the positive impacts of the modern technology by focusing on three issues in the subsequent paragraphs: (a) the distribution of cultivated land under different seasons, ecological and tenancy conditions, soil type etc. (b) cropping patterns, cropping intensity, and the production of crops, and (c) agricultural development and biodiversity. They also mentioned that the trend on seasonal utilization of land clearly signal that farmers had increasingly leaned on mechanized irrigation crops-pervasive in boro season- by gradually withdrawing from nature- dependents crops. They added, two decades back only 36 percent of the cultivated land could be brought under irrigation. The rapid growth of irrigation since the continued unabated covered 82 percent of the cultivated land in 2007. This shows that Bangladesh was able to achieve praiseworthy progress in terms of increasing irrigated land. And since irrigation is needed mostly for HYV paddy, it can also be argued that Bangladesh performed remarkably well in the production of these crops. Admittedly, the widespread cultivation of HYV paddy over time helped Bangladesh reduce its food deficit and, at the same time, save foreign exchange spent on the imports of food grains. Finally they mentioned four observations that are: (a) land under own cultivation drastically declined; (b) land under tenancy has increased rapidly; (c) exploitative and less productive share-cropping system is gradually losing ground to the fixed-rent or mortgage system, and (d) the share of owner-farmers decreased and that of tenants increased over time. They analyzed and mentioned some problems and prospects of agricultural production are also related with the agricultural change but did not mention the effects of these problems and prospects on the development in the rural areas of Bangladesh.

Mahul and Stutley (2010) in their book *Government Support to Agricultural Insurance: Challenges and Options for Developing Countries* said agriculture is a major economic sector and a critical source of livelihood in many developing countries. It is particularly exposed to adverse natural events such as draughts or floods, and the economic costs of major disasters may even increase further in the future because of climate change. Agriculture can contribute to spurring growth, reducing poverty and sustaining the environment. Agricultural producers face a myriad of risks that can threaten their output, their income, and ultimately their consumption. They added that the agricultural sector particularly affected by more frequent and more severe adverse natural events, such as draught, floods, and windstorms, thus reinforcing the systematic component of the adverse natural events. Theses are the environmental impact on agricultural production but did not mention the prospects of agricultural change and its relationships with the rural development. On the other hand adverse natural effect if one of the problems but so many problems are in the agricultural production that is not discuss or mention in their study.

Quasem (2011) in his article *"Conversion of Agricultural Land to Non-agricultural Use in Bangladesh: Extent and Determinant*s" said, with the growth of a country's economy, agricultural land is usually transferred to non-agriculture as the demand for non-farm products and services increases. This is specially so when the country's population and its per capita income rise. Transfer of farm land to non-agriculture is also needed for expansion of housing facilities in both rural and urban localities. Such transfer is also evidenced in building infrastructures such as roads, markets, educational institutions, electricity and industrial establishment etc. This is the on of the major problem in using arable land but they did not mention how possible to save the arable land and how are affected rural development by the use of more arable land.

Mainuddin *et al.* (2011) in their book *Planning and Costing Agriculture's Adaptation to Climate Change in the Salinity-Prone Cropping System of Bangladesh* said, Bangladesh is an agricultural country, where the vast majority of people depend directly upon their own farm production for survival. The country's agriculture is multi-faceted, labor-intensive, and has a low technological and resource base. Agro-ecological conditions are complex in most parts of Bangladesh- there are several distinct and types in the country. They added that that irrigation coverage through shallow tube wells (STWs) during the dry period has grown very swiftly following a policy of privatization and deregulation. As a result, the ground water in Bangladesh is declining at a rapid rate, causing STWs to become non-operational in many parts of the country during the dry period. Lack of surface water during the dry season limits the functioning of low lift pumps (LLPm) too. They mentioned the impacts of STWs but many other problems and prospects are found that directly or indirectly affects on the agricultural change. On the other hand rural developmental efforts depend on the agricultural change that has not been mentioned in their analysis.

Mohammad (2012) in his article *"The Agricultural Governance in Bangladesh: A Case Study* said, Bangladesh rice in its agricultural environment and development. There are various traditional varieties in the country. With the passage of time and socio-economic demands, some high yielding varieties has been cultivating in the country to achieve food security to fulfill the food and nutritional demand of the growing population of the country and to ensure food security, special emphasis has been laid on building up modern agricultural systems based on appropriate technology. As about 80% of our population lives in rural areas, relying mainly on agriculture for their survival, the sector plays a pivotal role in alleviation of poverty and sustainable economic development. But this sector is very much implicated with problems that are main obstacles to the development of the agriculture. Pesticides are chemically produced and used as poisonous for killing the insects in agriculture. He tried to relate between the agricultural production and development

but did not mention the problems and prospects of agricultural change on efforts to development in rural areas of Bangladesh.

Raihana (2012) in her article *"Factor Substitution and Technical Change in Bangladesh Agriculture"* said there are important changes in input mix due to introduction of modern technology and changes in relative factor prices in the agriculture sector of Bangladesh. As a predominantly agricultural country, all important activities depend on the agricultural sector. In the post independent period, a rapid expansion of irrigation, fertilizer and modern variety (MV) seeds caused a breakthrough in Bangladesh agriculture and Bangladesh made steady progress in crops production. She mentioned this study dealt with factor substitution and technical change in the Bangladesh agricultural sector for the first two decades after independence. During this period, important changes occurred in the production process. This study also shows that there is a gradual decline in fertilizer-irrigation substitutability; which implies that farmers are using both fertilizer and irrigation due to gradual awareness of the benefits of these inputs despite increasing prices of these inputs. She tried to investigate the nature and its impact of agricultural inputs that are related with more agricultural production and change but she did not mention the developmental impacts in terms of agricultural change.

2.2.2 Review of Related Literature in Aborod

Moor (1944) in his article *"Agricultural population and Rural Economy in Eastern and Southern Europe"* said, the level of agricultural production and the income of the agricultural production provide at least indirect measures of genaral economic development in any society, and naturally a largely direct measure in a predominantly agrarian society. He did not mention the problems or any prospects of agricultural change.

Sen (1966) in his book *The Strategy for Agricultural Development: And Other Essays on Economic Policy and Planning* said, the development of agriculture can help the development of our economy from the stragnant to the progressive stage in three ways: (a) by increasing the gross national product; (b) by supplying the physical surplus required by other sectors of the economy in the shape of food and raw materials; and (c) by providing the economic surplus which constitutes the material basis for economic development. This view is made on the basis of Indian agriculture. He mentioned the relation between agricultural development and economic development that is helpful to the rural people and country as well but did not mention the problems and prospects of agriculural development and production.

Sprague (1967) in his article *"Agricultural Production in the Developing Countries"* said Japan has the highest acre yields of paddy rice among the major rice-producing countries. There is evidence that rice was cultivated in Japan as early as 300 B.C. Through the centuries there has been a gradual expansion in acreage, improvement in varieties, and modification of cultural and production practices. These imply the symbol of agricultural change but did not analyse the problems or any prospects of agricultural change.

Lele (1972) in her article *"Agricultural Development in Asia"* said, a major portion of the national income is generated in the agicultural sector, although proportionately it is almost always less than the size of the population engaged in agriculture. Food production is of a subsistence nature-most of the food is used for domestic consumption and little is marketed. The domestic marketing systems, although they may be economically efficient within their present technological cofines, provide a great deal of scope for improvement through introduction of new technologies. All of the countries derive a major share of their foreign exchange earnings through export of primary goods. This is the prospects of agricultural production but she did not mention the prolems of agricultural change that is related with the development.

Hayami and Ruttan in his book *Agricultural Development: An International Perspectives* **(1980)** Viewed in a historical context, the problem of agricultural development is not that of transforming a static agricultural sector into a modern dynamic sector, but of accelerating the rate of growth of agricultural output and productivity, consistent with the growth of other sectors of a modernizing economy. Similarly a theory of agricultural development should provide insight into the dynamics of agricultural growth- into the changing sources of growth- in economies ranging from those in which out put 19 growing at an annual rate of 4.00 percent or more.

Gupta (1982) in his article *"Population Growth and Pattern of Land Utilization in Punjab"* said, the study reveals that by adopting land augmenting innovations and modern technology agricultural production can be increased to meet the demands of ever increasing population. By this, cultivable waste land has been reduced in Punjab and at the same time cropping intensity has been increased. Analysis of occupational structure reveals increase of workers in agricultural activities as compared to secondary and tertiary sectors. But he did not discuss the causes behind the cropping intensity and problems or prospects of agricltural change.

Bonanno (1989) in his book *Sociology of Agriculture: Technology, Labour, Development and Social Classes in an International Perspective* said in Indian perspective that Appropriate Technology (AT) is not a special package of technologies but represents an approach to integrated rural development. It involves a wide array of technologies that range between the traditional and the modern; between the simplest and the most complex technologies, between the bullock-cart and the jet plane, between the cottage industry and the heavy industrial conglomerates. Appropriateness is a function of culture, socio-economic condition and the purpose for which a technology is sought. He added, the need for Appropriate Technology itself is a clear expression of the contradictions embedded in the dialectics of development. In other words, modern technology is not suitable for augmenting the desired economic development in its vastness.

Moderntechnology will create only more and more concentration of wealth and widen the existing disparities between social classes and geographic regions. The twin purposes of the AT in agriculture are to grow more food and to make rural labour more productive and less arduous.

Moreover he added Pesticide use, a critical modern agriculture input, has become an established global practice. Together with synthetic fertilizers, it is increasingly chemicalizing agricultural production and agro-ecosystems. The problem is particularly acute when highly vulnerable high-yielding varieties of crops are grown. In general, three main strategies of pest control are available to farmers: (1) control by chemicals; (2) control by biological methods, i.e. predator insects and (3) integrated pest management which includes chemical, biological, mechanical and cultural means of pest control in which the use of chemicals will be lowest

Roy (1990) in his book *Agriculture and Technology in Developing Countries (India and Nigeria)* said, India in South Asia and Nigeria in West Africa lend themselves to a comparative study. Both adopted modern technology to increase food production, but India has been relatively more successful than Nigeria. India was among the first developing countries to adopt such farming strategies under the "Green Revolution" in the mid sixties. This has been sustained and expanded throughout the country. Indeed, India became self-sufficient in food within a relatively short time-span after laucching the "green revolution". But it has yet to resolve consumption and equity problems, highlighted and intensified by the latter. Increasing food production in developing countries is a central issue in the field of agricultural development.

Rerkasem (1998) in his article *"Shifting cultivation in Thailand: Land use changes in the context of national development"* the relationships between population and agricultural production in Thailand's perspective which is more relevant to Bangladeshi agricultural production. He said the use of land has been modified for wetland rice production, multiple cropping, and for the production of fruit and vegetables. Agricultural systems have changed in response to increased population

and productivity requirements, government policy, and improved access and transportation to markets.

Pender (1999) in his book *Rural Population Growth, Agricultural Change and Natural Resource Management in Developing Countries: A Review of Hypotheseses and Some Evidence from Honduras* said that population pressure leads to land degradation in a situation of relatively low population density and available land, by encouraging expansion of agricultural production onto marginal steep lands and causing lower land productivity. Population pressure promotedadoption of some labor- intensive soil fertility management practices and land improvements, although the adoption of such practices remained low and was largely determined by the presence of technical asistance programmes. Moderate population growth wa found to promote collective action to manage common resources and organizational development, consistent with the induced innovation hypothesis.

Rao and Jeromi (2000) in their book *Modernizing Indian Agriculture: Priority Tasks and Critical Policies* said the post- Independence decades have witnessed a veritable transformation in Indian agriculture. What is most readily noticed is the increase in agricultural production, particularly the nearly four-fold rise in the production of food grains which saved the country from one of the gravest crises it faced after Independence. The increase in production was made possible by expansion of irrigation, spread of new technology and additions to rural infrastructure like irrigation works, roads, market yeards and waterhouses. The changes in the physical features of agriculture needed changes in the institutional structure- like new credit institutions, extension agencies, regulated markets, control of moneylenders. The cumulative effect of these changes has been reflected in the farmers- their perceptions, attitudes and behaviour and in the changing features of rural communities such as stratification, diversification, commercialization and exposure to outside influences. The total process bringing about these wide ranging changes could be described as modernization of

agriculture. In a rural-cum-agriculture-based society like India, the process of modenization of agriculture through its direct and indirect impacts would be a major determonant of economic status, development and welfare of rural people.

Marothia (2003) in his article *"Institutions for Common Pool Resources"* said, ground water accounts for over half of the total irrigated area in India. The expansion of ground water irrigation was largely due to imposed drilling and lifting technologies lower per unit cost of water pumping, massive rural electricity program, liberal credit for exploring ground water and subsidized supply of electricity. The productivity of irrigation in conjunction with chemical fertilizers and high-yielding varieties (HYVs) is much higher for ground water as compared to canal, mainly due to less wastage of water and flexibility to adjust the timeliness and quantity of water distribution to crops. He added that efficient, equitable and sustainable use of ground water can be achieved through providing appropriate technological support for regulation of spacing of tube wells, identification of acquitters, size of pumps, and control on the overall rate of exploitation.

Okamoto (2004) in his article *"Agricultural Marketing Reform and Rural Economy in Myanmer: The Successful side of Reform"* said, agriculture in Myanmer, dominated by paddy rice cultivation, generates a direct or indirect economic livelihood for over 75% of the population. Rice is grown throughout the country by resource poor rural farmers and landless agricultural laborers on small farms averaging only 2.3 ha in size. What kinds of resource poor farmers he did not mention his article. It is possible to know the nature of resource farmers or not in the study area by this study.

Dash (2005) in his article *"Regional Food Security Experience: Lessons Learnt from India and Timor Leste"* Said, rural infrastructure and agricultural and non-agricultural employment enhance livelihood opportunities and food access thereof. Agriculture in the country is mainly rain-fed and most of the areas produce only one crop a year. He did not mention the problems and prospects of agricultural

production as well as the agricultural change that is also related with the efforts of rural development.

The World Bank (2005) mentioned in low-income countries, broad-based growth in agricultural productivity is one of the most effective ways of reducing poverty because it increases the incomes of small-scale farmers; and improves the availability, quality, and accessibility of food. Agriculture is important to the incomes of the rural poor. Through growth in agricultural productivity and higher farm profits, the rural poor can generate additional income to purchase more food, including more diverse kinds of food. Some poverty reduction strategies recognize the importance of satisfying the immediate need for food before addressing longer term development goals. Success in agricultural development has been based largely on increasing the use of land, irrigation, and inputs to expand production of staple grains and a small range of exports commodities, but these strategies must be sharply adjusted to accommodate new realities.

Bage (2006) in her article *"Seeds of Hope"* said, three quarters of the world's 1.1 billion extremely poor people live in rural areas and depend on agriculture for their survival. The families of participating farmers in Uganda increased their food security. She added that agricultural growth and development require investment and technology. With them huge productivity gains are possible. Over the past 20 years increases in government spending on agriculture in East and South Asia have been clearly linked to rapid growth in agriculture and to progress towards achieving the Millennium Development Goals.

Pinto (2006) in his article *"Pillars of Wisdom"* said, Brazil is investing more and more in sustainable agriculture-harmonizing the exploitation of natural resources with preserving the environment-to make the best use of its huge agricultural potential. Around 28 percent of its GDP derives from agribusiness, so it is crucial to direct this to competitiveness and sustainability. He added that modern, effective and competitive, agriculture in Brazil is a prosperous, safe and profitable activity with a diverse climate, constant rain, abundant solar energy and natural resources,

almost 13 percent of the world's fresh water and a total area of more than 8,500,000 square kilometers, the country cultivates around 50 million hectares with annual crops and 20 million hectares with permanent ones and planted forests.

Malla (2008) in her article *"Climate Change and its Impact on Nepalese Agriculture"* said Nepal's economy depends on agriculture. The impacts on agriculture are the decrease of productive land in some region and increase in other region. Climatic parameters have potential impact to change the ecological distribution of agricultural crops. Climate change parameters: temperature, rainfall pattern and humidity have an impact on the development and distribution of pests and diseases.

World Development Report (2008) in the 21st century agriculture continues to be a fundamental instrument for sustainable development and poverty reduction. Agricultural production is important for food security because it is a source of income for the majority of the rural poor. Irrigated land productivity is more than double that of rain fed land. Rapid agricultural development also contributed substantially to the dramatic poverty reduction in Vietnam over the past 15 years and is likely to remain an important pathway out of poverty for many of Vietnam's poor. The progress in agricultural growth in developing countries has been dominated by the significant gains in Asia, especially in China. Chemical fertilizer use has also expanded significantly in most of the developing world, except Sub-Saharan Africa.

Kar and Kar (2008) in their article *"Environment and Changing Agriculture Practices: Evidence from Orissa, India"* said that agricultural income is largely dependent upon input prices of livestock and that of fertilizer. If prices of inputs like seed pesticides and other implements is increased by a single percentage point farm income will fall by 28%. One percent increased use of labor power also reduces farm income by 19%. Farm income increased by 11% and 13% respectively; with increased use of bullock power and fertilizers. Improved agricultural practices are beyond their reach.

Rivera and Alex (2008) in their article *"Hunan Resource Development for Modernizing the Agricultural Workforce* said, agricultural education and training in an expanded educational network system is needed to create an integral agricultural and rural development effort. Agricultural education "system", including extension, formal education, in-service training, and mass media/distance education programs require comprehensive attention to be able to prepare the agricultural workforce to meet new challenges.

Hartemink *et al.* (2008) in their article *"Land Cover Change and Soil Fertility Decline in Tropical Regions"* said globally, land use has changed considerably in the past decades- mostly reflecting the enormous growth in human population and their need for food. The growing population has may implications but most of all it requires an increase in agricultural production to meet food demand. This demand can be met by expansion of agricultural land or by intensification of existing systems. Soil degradation, and in particular the decline of soil chemical fertility, is a major concern in relation to food production and the sustainable management of land resources.

Naing *et al.* (2008) in their article *"A Survey of Myanmar Rice Production and Constraints"* said, most farmers in both upper and lower Myanmar sowed seed from their own harvest or from neighboring farms, rather than purchasing seed as recommended from the Myanmar Agriculture Service (MAS). The effects of weed control and insecticide application interacted with fertilizer application. The most common problems of fertility are inadequate amounts and improperly applied mineral and organic fertilizers. This study shows that agronomic problems such as low rates of applied manure and chemical fertilizers, low seed quality and poor weed and water management appear to be the most serious limitations to rice production in Myanmar. They mentioned the problems of agricultural production but did not mention the prospects of agricultural production and its relation with development.

Sassentrath *et al.* (2008) in their *article "Technology, Complexity and Change in Agricultural Production Systems"* said the intensification of agriculture over the past 50 years has resulted in impressive yield improvements. Improvements in mechanization have increased production output with fewer people, and improved the safety of farm workers. The world growing population and increasing income imply increased demand for agricultural goods

Oweis and Hachum (2009) in their article *"Supplemental irrigation or Improved Rainfed Agriculture in WANA Region"* said, there are three primary ways to enhance rainfed agricultural production, namely: (i) to increase the effective rainfall use through improved water management; (ii) to increase crop yields in rainfed area through agricultural research; and (iii) through reformed policies and increased investment in rainfed areas. They added that inputs other than water and improved cultural practices are also necessary for maximizing profits.

Lampietti *et al.* (2009) in their book *The Changing Face of Rural Space: Agriculture and Rural Development in the western Balkans* said a more competitive agri-food sector needs a rural economy that can absorb surplus agricultural labor into alternative economic opportunities. Agriculture is not enough for rural areas to thrive. Small holders that lack sufficient resources (land, capital, and labor) to succeed in agriculture need alternative income opportunities to avoid poverty. He added that climate conditions in much of the western Balkans offer natural advantages in bringing agricultural products to the market earlier and longer. The region is warm and has a longer growing season than the rest of Europe. They also mentioned facing various constraints- limited irrigation infrastructure, small land size, low productivity, high input costs, weak rural infrastructure, and underdeveloped rural credit markets- the Western Balkans agri-food sector appears less resilient to climate change than other regions of Europe.

Mimi and Jamous (2010) in their article *"Climate Change and Agricultural Water Demand: Impacts and Adaptation"* said climate change is projected to have significant impacts on conditions affecting Palestinian agriculture. Climate change will have large impacts on the agricultural water demand, reliability and security of water systems in Palestine. They did not mention the prospects of climate change issues that are also related with development.

Ghosh (2011) in his article *"Determinants of the Changes in Cropping Pattern in India: 1970-71 to 2006-07"* said the economy of India is predominantly agricultural. The contribution of agriculture to the total State Domestic Product (SDP) has been continuously decreasing from 55.11 percent in 1950-51 to 44.26 percent in 1970-71, further to 31.37 percent in 1990-91 and more recently at only 17.75 percent in 2007-08. Though the proportion of agriculture and allied activities to GDP has been decreasing over time, the majority of the population of the country earns their livelihood from the agricultural sector... it is clear that the cropping pattern in the agricultural scenario of India in terms of allocation of acreage has been skewed towards food grain cultivation. It is also found that in the cropping pattern changes, the expansion effect could explain 63.67 percent of the gross cropped area and the remaining 36.33 percent of the gross cropped are was due to the substitution effect... the cropping pattern of the country is still dominated by food grain. The change of cropping pattern is basically the results of adoption of new crops and the intensification of cultivation through multiple cropping. More preciously changes in cropping pattern over time are also function of changes in the extent and quality of irrigation and the relative costs and returns to competing crops and crop combination.

Kumar (2012) in his article *"Adoption of Drip Irrigation System in India: Some Experience and Evidence"* said the study has revealed that adoption of drip irrigation technology has increased the net sown area, net irrigated area and thereby has helped in achieving higher cropping intensity and irrigation intensity. The adoption of drip irrigation is significantly influenced by experience, farm size,

proportion of wider spaced crops and participation in non-farm income activities. He also mentioned that the drip method of irrigation has a significant impact on resources saving, cost of cultivation, yield of crops and farm profitability. This may be the prospects of agricultural change in Bangladesh but did not mention the problems of irrigation system as well as the agricultural change and its relation with the development in the rural people.

Durga and Kumar (2013) in their article *"Economic Analysis of the System of Rice Intensification: Evidence from Southern India"* said the introduction of high-yielding varieties, fertilizers, pesticides and irrigation has improved rice yields significantly and expanded the area under which rice is cultivated. However, in the last 20 years yields and the area under rice have stagnated. The two most significant reasons for this stagnation are the lack of adequate water for irrigation and the increased costs of cultivation. This is very important for the understanding the Bangladeshi agricultural production and change but it was more significant by the discussion of its relation on efforts to development in the rural areas.

From the above reviews, it is found that all the scholars and researchers discussed and analyzed different agricultural issues like- developmental indicators and its relation with production, nature of agriculture as well as agricultural production, using pattern of chemical fertilizer, agricultural classes, the impact of green revolution, development of the rural poor, nature of agricultural change and risk, social status of landowner and landless, role of agricultural inputs, development as a process, price of crops, MV boro production and its nature, crops diversity, self-sufficiency in food grain production, shifting cropping pattern, challenges of rice production, impact of modern technology, awareness of the rural farmers, food security situation, role of agriculture, problems and prospects of agricultural production, soil fertility, agricultural transformation, opportunities and threats of agricultural change, agro-ecological condition, agricultural production per acre in the different countries, appropriate technology, technology use in different countries, impact of climate on agricultural production, intensification of

agriculture over last 50 years, ways to enhance rain fed agricultural production, and adoption of drip irrigation technology both in home and abroad. These are much more relevant with the present study but nobody analyzed what are the problems and prospects of agricultural change and how it is related with rural development. In this study, it has been tried to identify the research gap as well as the problems and prospects of agricultural change on efforts to development in rural areas of Bangladesh.

2.3 Conceptual Framework

Agriculture is the cultivation of plants for food and raw materials also (Jary and Jary, 1995). In Bangladesh agricultural sector divided into three sub-sectors: (i) crop sub-sector, (ii) livestock sub-sector and (iii) fishing sub-sector. Besides the three forests sub-sector may also be mentioned (Rahman, 1992). In this study, agricultural change is called by the change of cultivation of aforesaid sub-sectors and crop sub-sector has been given priority. Bangladesh has infact achieved near self-sufficiency in cereal production of which 92% consists of rice and about 7% is contributed by wheat, a new crop in a traditionally rich growing environment. Rice occupies about 80% of the total cropped area (Biswas, 1993). Crop production is by and large diversified in Bangladesh as more than a hundred crops are grown depending on farmers choices and preferences with respect to soil, climate and their tastes and economic gain … Agro-climate factors are, infact, the basic determinants of a cropping plan; nevertheless, the socio-economic factors do influence the ultimate selection or crops to be grown (Biswas, 1993).

Traditional production system never can expected development due to low productivity. Traditional production system may be changed through agricultural change as well as high productivity. Modern input helps to change such system. So, development is possible in rural areas that are directly or indirectly depend on agriculture. Increased agricultural production through irrigation is a national goal and as a result about 33 percent of the cultivable land has been brought under

irrigation by the year 1989-90; and around 90 percent of this irrigated land is under minor irrigation technologies (Hossain, 1990).

Increase in productivity depends largely up on improving the means of production. It depends upon the growth and development of technology and the ability to invent and apply new ideas and innovations. This again demands an attitude of reasoning both towards nature and towards social relationships (Asan, 1964)

Evenson and Kislev (1975) said recent developments in agriculture have been characterized not only by increased use of resources- land, fertilizers, water, and machinery- but also by increasing productivity. From the same set of inputs farmers have been receiving increasing amounts of output. These productivity gains are due to improve quality of the factors of production, better knowledge, and better infrastructure and institutional arrangements.

Modern agricultural production system helps to change the traditional agricultural sectors. Input of modern agriculture creates surplus production. Surplus production helps to the development of the rural people.

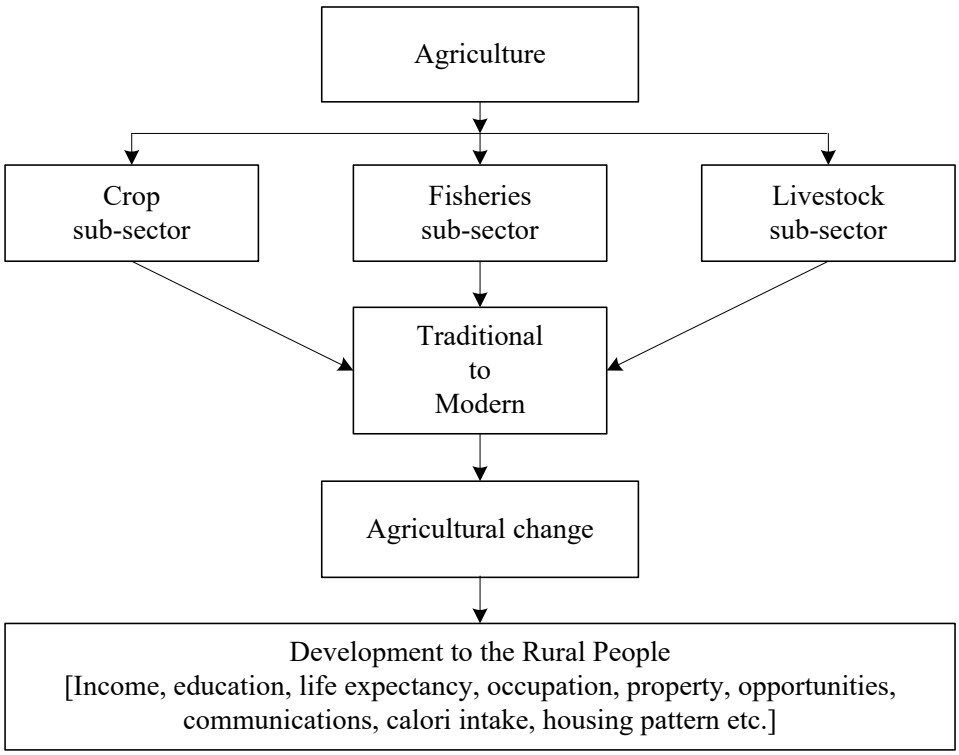


Fig- 01: Agricultural change and its impacts

Increase of per capita income is treated development in traditional economics. But so many changes came in this notion by periodical change. Different dimensions and elements have been included in development ideas. Now, development is treated a multidimensional social phenomena. According to Todaro (1998:16), "Development must therefore, be conceived of as a multidimensional process involving major changes in social structures, popular attitudes and national institutions, as well as the acceleration of economic growth, the reduction of inequality, and the eradication of poverty. There are some indicators of development in the study area that are analyzed of which income, savings, education, occupation, property, housing pattern, opportunities, etc. are mentionable.

These indicators are interrelated with one another. Source and amount of income is very significant in rural areas. Satisfactory income helps to acquire land, education, development of house, etc. Much more income helps to invest and on economic activities which develop the society as well. Savings depend on income that helps to get educations, occupation, property, housing as well as the betterment of livelihood. Education helps to get occupations and also plays an important role on agricultural development, and creates awareness regarding many sociological issues. It is related to income. Because highly educated persons can gets chance to better job and salaries opportunities. Education helps to change traditional opportunities and exercise modern attitudes. Occupation is necessary to occupy a social position in society. Better occupation depends on income, education, property, opportunities etc. On the other hand, occupation helps to earn money, children education, achieving property etc. The demand of arable land has been increased in the study area that reflects on land selling due to the buyers are available but land seller is very few. The purchasing capacity has been increased due to the agricultural production more as well as the agricultural change in the study area. Housing pattern is a significant indicator to measure the development in the rural areas. It is measured in terms in their life or differentiates among their

father or grandfather. In rural areas it is absolutely depend on the agricultural production. Opportunities are varied from the rural and urban areas with rural areas to rural areas. By the help of opportunities man can achieve their expected needs but sometimes lack of opportunities fails to achieve anything.

In rural areas, it has significant relationships between agricultural change and development, and development indicators have their internal relationship that effect role for the development of the rural people of Bangladesh.

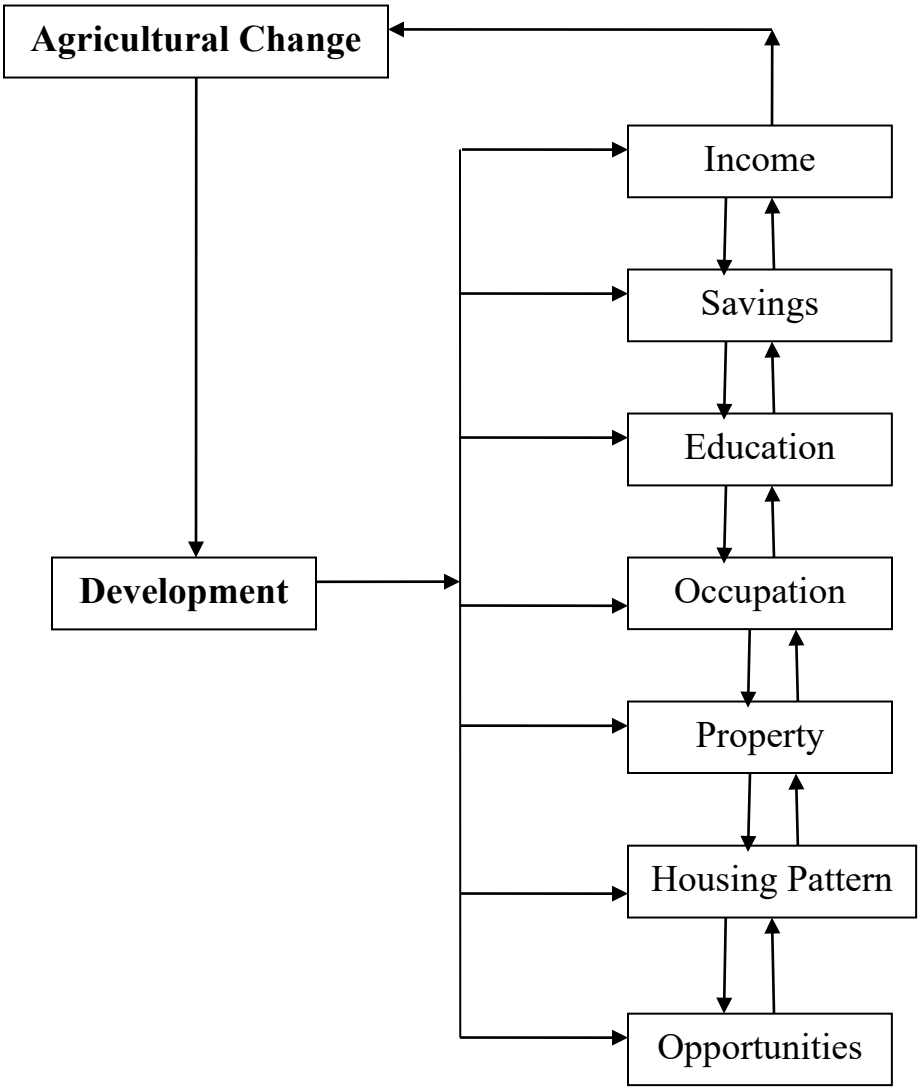


Fig- 02: Interrelationships between the concepts

It is also realized that the eradication of mass poverty will not be possible without effective mobilization of the rural people and their active participation and involvement in the development process.

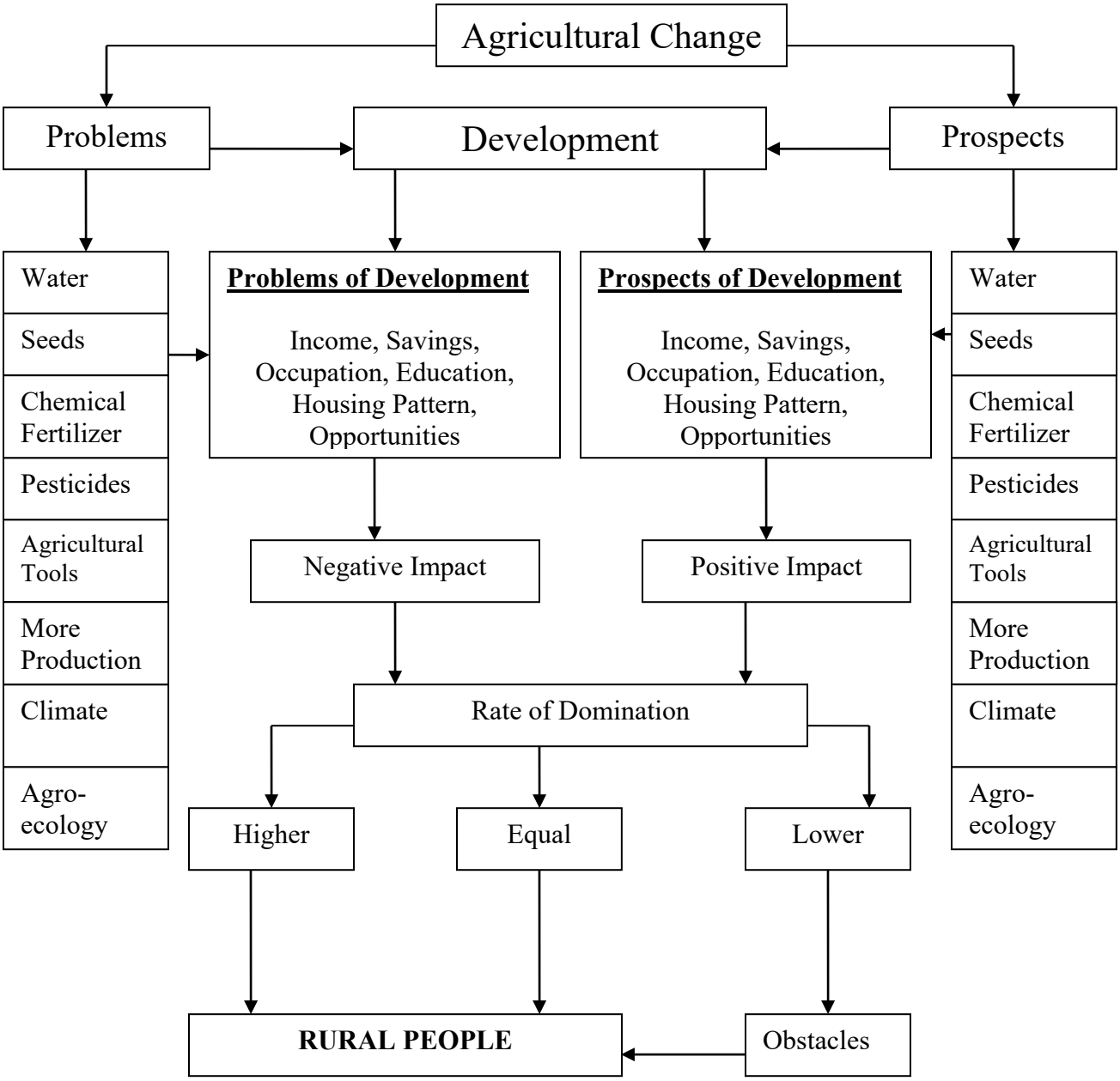


Fig- 03: Analytical frame work

In this study, through the analytical frame work it is tried to identify the problems of agricultural change, prospects of agricultural change and its impact on efforts to development in the rural area as well as the study area.

*2.*4 Theoretical Framework

2.4.1 Theory of Agricultural Change

Agricultural change refers not just to the difference between the first plantings 10,000 years ago and today's computerized, genetically engineered production system; agricultural change occurs on a daily basis, as farmers in every country of the world make decisions about what, where and how to cultivate. The importance of the topic goes well beyond how much food is produced, how much money is made, and how the environment is affected: agriculture is intimately linked to many institutions in every society and to population.

Agriculture change has been anchored by two small books with enormous impact, both focused on the relationship between farming and population. In 1798, British clergy man Thomas Malthus argued for an intrinsic imbalance between rates of population increase and food production. He infused popular and scientific thought with a particular model of agricultural change, in which a generally operated at the highest level allowed by available technology.

In 1965, Danish agricultural economist Ester Boserup claimed to upend this model of agriculture by arguing that, particularly in 'primitive' agricultural systems, farmers tended to produce well below the maximum because this allowed greater efficiency (output input ratio). She maintained that production was intensified and additional technology adopted mainly when forced by population. Such model is quite simple –dangerously over simplified, many would now argue- but they provide invaluable starting points from which to address the complexities of agricultural change.

Agriculture, specifically grass-roots (developing world) agriculture, and significant forces both outside and therein, as a means of development, is the focus of empirical study. Agricultural change helps to development of the people. But sometimes it depends on population growth. So, there are long held views of the inter-relationship of agricultural change, and increasing population pressure (Boserup 1965, 1990; Rasul & Thapa 2003; Sanderwell, Ohlsson & Sawathvong

2001; Schultz 1990). The macroeconomic theory of the relationship between demographics and agricultural change was first postulated in 1798 by Malthus and Ricardo in Europe and then related to demographic transitions in other parts of the world (Boserup 1990). Malthusian theory postulated that agricultural production and food supply was a limiting factor to population growth. With a fixed land supply, increasing human population would press on the supply of land and food, increasing the chance of war, pestilence, and famine. Rising death rates and falling birth rates would stem the population growth, to then balance in line with the land and food supply (Marris 1999). Malthusian theory was discredited but reemerged in the 1960's as neo-Malthusianism, where the constraining factor was defined as the total natural resources of the planet, rather than the supply of cultivable land (Marris 1999).

Neo-Malthusians believed that increasing population could outstrip agricultural growth (Turner and Brush 1987). Boserup (1965) challenged Malthusian theory by establishing that changes to cultivation systems were explained by differences in population densities. With increasing population densities, greater agricultural production, and intensive land use takes place, pushed by developing market forces (Lele & Stone 1989). Growing population pressure and increased subsistence requirements stimulated farmers to shift from extensive to intensive land use systems with the adoption of new technologies (Lele & Stone 1989; Rasul & Thapa 2003). Furthermore, Boserup (1990) focused on the inter-relationships of labor productivity, population pressure, and demographic and economic behavior (Schultz 1990). Boserup's theory suggests that population pressure promoted technological change and patterns of land use that raised the economic productivity of labor through intensification, land investment, and multiple cropping (Lele & Stone 1989; Schultz 1990

Brookfield (1972, 1984) challenged Malthusian and Boserup's theories by suggesting that agricultural production can be for subsistence needs, social production, and for trading purposes. He claims there are no clear distinction

between innovative practices and processes of intensification that modify farming systems. The scale of analysis then becomes important when describing agricultural change.

Turner and Brush (1987) contrast theories of agricultural change by noting that several key variables are common to all theories. These key variables include population density, land availability, agricultural technology, market impacts, and economic and political structures, that all act to stimulate change. Farming system change can be viewed in terms of structural and technological change. Structural change is a change in the socio-economic relations of production, land, and capital. Technological change can be observed through the variety of technologies, the management practices, productivity, and efficiency.

2.4.2 Development Theory in Agriculture

Development theory is a conglomeration of theories about how desirable change in society is best achieved. In development theory, modernization theory is used to analyze in which way modernization processes in agriculture and agricultural societies take place. The theory looks at which aspects of countries are beneficial and which constitute obstacles for economic development. The idea is that development assistance targeted at those particular aspects can lead to modernization of ‘traditional’ or ‘backward’ societies.

The earliest principles of modernization theory can be derived from the idea of progress, which stated that people can develop and change their society themselves. Marquis de Condorcet was involved in the origins of this theory. This theory also states that technological advancements and economic changes can lead to changes in moral and cultural values in the context of agricultural production.

Other scientists who have contributed to the development of modernization theory are: David Apter, who did research on the political system and history of democracy; Seymour Martin Lipset, who argued that economic development leads to social changes which tend to democracy; David McClelland, who approached

modernization from the psychological side with his motivations theory; and Talcot Parsons who used his pattern variables to compare backwardness to modernity.

Agricultural modernization creates commercial agricultural production opportunities that are also helpful for the development of the rural people. These may be called the pattern of modernization in agriculture which is given below.

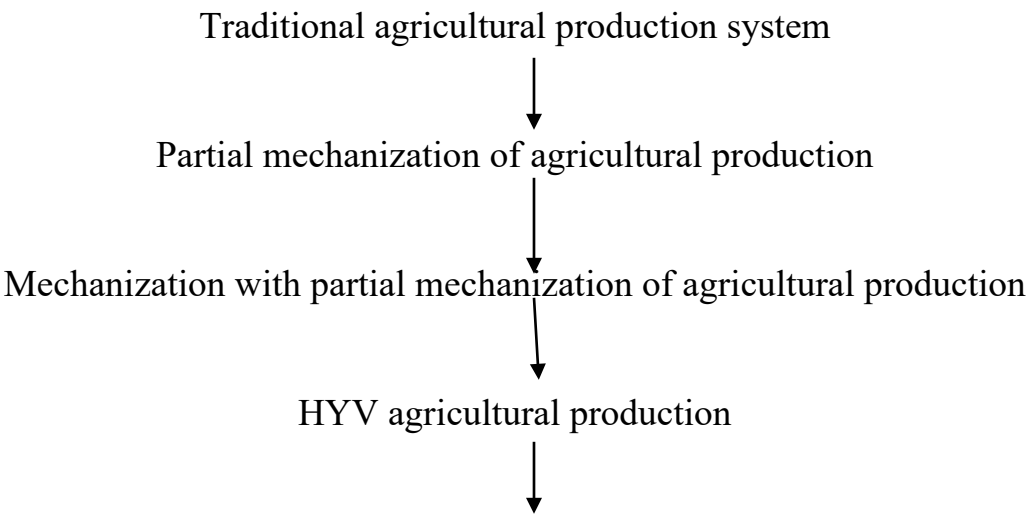


Fig-04: Pattern of modernization in agriculture

2.5 Summary

A number of documents like books, journals, web articles both home and abroad are reviewed in the relevant field that help to identify the research gap. Through the conceptual framework, it is helpful to establish the relationships between the concepts. Discussion regarding theoretical framework is helpful for analyzing the study and innovation of new ideas. The main aim of analytical framework is to identify the problems and prospects of agricultural change and its impact on efforts to development in rural areas of Bangladesh.

CHAPTER – THREE

RESEARCH METHODOLOGY

3.1 Introduction

The success of a science depends on making its theory and the success of theory depends on using its method. In social science so many scientific methods are used in the study on social issues. Methods are used on the basis of the objectives of the respective study. One or more methods are used at a time in a study. Methodological issues start from the beginning of a research in terms of the selection of research topic. Sociological research methods have definite techniques and tools to collect data. Data are collected from a specific study area which is relevant and significant to the study. After collection of data, data are analyzed and presented in different form where it is necessary. The operational definition is important to understand the using concepts in the study.

3.2 Study Area

3.2.1 Demography

The study is conducted at Bilsha of Gurudaspur Upazilla under the district of Natore. This area is situated at the middle *Chalon Beel* in Bangladesh. The total area of Bilsha is 1891 acre, total households are 797 (BBS, 2001). There are 28 (twenty eight) paras in the study area which are- Boro para, Kamar para, Farazi Molla para, Holar para, Shah para, Penay para, Abul para, Hagi para, Akash para, Bazar para, Moddho para, Akla para, Vikar para, Molla para, Scholl para, Sarker para, Khanka para, Hindu para, Hari para, North para of the pond, Purbo para, Vokti para, West para of the pond, Shoardi Shah para, Madrasa para, Poshchim para, Dokhin para and Bridge para.

There are some reasons to chose behind this study area, which are firstly, no study like subject matter has been conducted in this area; secondly, most of the people of this area are producing various types of boro, which produce in one season; thirdly, it will help to know, how they are facing troubles and their efforts to development

as a remote area; fourthly, this area like demographic, physical and agro-ecological are more relevant to agricultural production and change; Fifthly, respondents are expected to provide the right data spontaneously and finally, the study area is well known to all as agricultural production zone which help to explore new ideas in rural areas of Bangladesh.

3.2.2 Population

Total population is 3549 of which male are 1808 and female are 1741. 790 households are Muslims and 7 households are Hindus (BBS, 2001).

3.2.3 Economic Condition

Most of the people of this area directly or indirectly depend on agricultural activities. Many people have their primary and secondary occupation. Some one is involved in non-agricultural activities.

3.2.4 Social Class

There are 10 (ten) classes in the study area that are agriculture, service (primary school teacher, high school teacher, college teacher, technical college teacher, madrasa teacher, peon) businessman, imam, moazzen, doctor, carpenter, fisherman, tailor and laborer.

3.2.5 Communication System

Communication system divided into two ways. Firstly in summer season *kacha rasta* is only way to go outside the village. Bicycle, van, bull cart, motorcycle and on foot are the way to move forward. It is difficult to move anywhere incase of rainfall, in that time there is no alternative way without using foot. In the inter para communication system is developed trough *goli.*

Goli is developed by the sacrifice of neighbor beside convenient place of the houses. In the rainy season boat is only way to moving the people. The study area is almost scattered in the *paras* (para is made by some houses) and looks like an island so that people move even in their different para by boat. For this reason a boatman class is developed in the rainy season temporarily.

3.2.6 Education

Total literacy rate in the study area is 37.06% of which male is 44.669% and female is 29.18% (BBS, 2001). There are one high school, one college, one primary school, one dakhik madrasa, one girls' madrasa, one hafezia madrasa and one moktob in the study area. The qualified teachers are trying to teach their students for quality education.

3.2.7 Religion

Total population is 3549 of which male are 1808 and female are 1741. 790 households are Muslims and 7 households are Hindu (BBS, 2001). There is a central mosque in the village at boro para. Besides this there are three mosques in the village, one in the bazar para, one is in the kamar para and another is nearer to the dhakil madrasa. There is a common graveyard at north-east corner of the study area.

3.2.8 Recreation

There is a central playground at the east of the study area. There is a club (Shobuz Shongho) in the village. The educational institutions are organized cultural program in their different occasions. Besides these different festivals like village fair, respective religious festival are the sources of their recreation.

3.3 Techniques of Data Collection

Methods	Techniques	Tools	NR*	Target Group	Analytical issues
Social Survey	Observing	Eyes and other senses, watch	265	agricultural production, livelihood	Agricultural production scenario and development.
	Interviewing/ Interview schedules	Questionnaire		Different occupational classes	Socio-economic, land tenure, agricultural production, agro-ecology, impact of climate issues.
Case Study	Observing, in-depth discussion, checklist	Notebook	05 (from 265)	Farmers and others occupation who are well known to crop production and development	Nature of agricultural production, relationship with agriculture and development.
PRA	FGD, Checklist	Rapport building, transact, mapping, seasonal diagram, pie chart	07	Major occupational classes	Major activities, agricultural and other change in relation with development
KII	Checklist	Notebook	05	UP Chairman & member, Agriculture officer, Teachers.	Problems and prospects of agricultural change, Its relation with development.

*Number of Respondents (NR)

Fig-05: Summary of research methodology

3.3.1 Primary Data

Primary data are collected from the selected head of the households. A questionnaire is used in collecting data. Questionnaire is filled up by the researcher through face to face interview conversation with the respondents. Data also collected from the key respondents. Those who are more experience and skill regarding agriculture and related field are the key respondents in this study.

This study is both qualitative and quantitative in nature. On the basis of the objectives of the study, data are collected through the mixed method including three sociological methods which are social survey, case study and Participatory Rural Appraisal (PRA).

A survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population (Creswell, 2009). The chief features of the survey are: (i) it is a field study and conducted in a natural setting; (ii) it seeks response directly from the respondents; (iii) it cal cover a large population; and (iv) it covers a definite geographical area (Narayanasamy, 2009). According to social survey method at first total households are marked of its characteristics. Secondly, 33 percent households are selected for collection of data by using sampling technique. Questionnaire is used in collection of data as a tool of social survey method. Both open-end and close-end questions are included in the questionnaire. Questionnaire is filled up by the researcher. Because a large numbers of the rural people are not aware in developing studies.

To know more regarding the agricultural change and efforts to development, in-depth study is essential and case study method can play significant role in this regard. That is why techniques of case study method is used in the study. By this method collection of more information in respecting the study are possible very easily.

Very recently, Participatory Rural Appraisal (PRA) method is using in development studies. By this method respondents can easily express their opinion on various sociological aspects and issues. Rural developmental issues may be attractive and pragmative through using PRA. Because, it is a collective efforts of development studies to the anticipating groups. PRA is also very much significant in agricultural development study. Transact, Rapport Building, Mapping and Pie chart tools are used in PRA method. McCracken *et al.* (1988) define PRA as “a semi-structured activity carried out in the field, by a multi-disciplinary team and designed to quickly acquire new information on, and new hypothesis about rural life”. Some of

the important features that emerge from this definition are: (i) it is a field-based appraisal undertaken by a multi-disciplinary term; (ii) it is quick; (iii) it is mostly an information-gathering technique and (iv) it is exploratory in nature.

On the basis of the objectives and nature of the study questionnaire is formed systematically. Questions on personal affairs, socio-economic aspects, land tenure system or ownership, agriculture and agricultural change, agro-ecological system, and impact of climate on agriculture are included for collection of data. Researcher himself collected primary data from the study area through using the aforesaid techniques and tools of respective methods.

3.3.1.1 Sampling

Total households in the study area are 797 of which agriculture are 603, Fisherman are 66, Service are 63, Business are 41, Laborer are 10, Imam are 03, Moazzen are 03, Tailor are 03, Rural doctor are 03, and Carpenter are 02 in number. According to the Stratified Sampling households are stratified in terms of occupation. 33 percent households from each occupation are selected through using the Simple Random Sampling technique. The total 265 (two hundred sixty five) households are selected for collection of data. 05 (five) respondents are selected for case study from the total of 265 (two hundred sixty five) households. Data are collected from the head of the selected households. Besides these 01 (one) FGD is conducted by 07 (seven) participants and 05 (five) Key Informants Interview (KII) are selected for data collection in the study.

Sl No.	Occupation	Number	Selection of 33 percent
01	Agriculture	603	199
02	Fisherman	66	22
03	Service	63	21
04	Businessman	41	14
05	Laborer	10	04
06	Imam	03	01
07	Moazzen	03	01
08	Tailor	03	01
09	Rural Doctor	03	01
10	Carpenter	02	01
Total		**797**	**265**

Fig-06: Number of the selected respondents

265 respondents are selected on the basis of the guide to minimum sample size (95% confidence level, +/- 5% margin of error) by the direction of Krejcie and Morgan (1970) chart[1] who mentioned the population size and its sample size.

3.3.2 Secondary Data

Secondary data are collected from the secondary sources like books, journals, internet etc. Data regarding demographic and related others are collected from the statistics office from the upazilla statistic office of Gurudaspur under the district of Natore. For better understanding of the agricultural change, data also collected from the upazilla agriculture office of Gurudaspur under the district of Natore.

3.4 Analysis of Data

The present study is explanatory and analytical in nature. So, after collection of primary data, data are edited, coded and tabulated with computer, calculator and other relevant tools which are needed to analyze the data. Analyzing data are presented through histogram, pie chart, graphic and necessary statistical formation.

Necessaries point of views statistical calculation is used to analyze the data in the study. Relationship between the concepts or variables is analyzed statistically.

3.5 Agro-Ecological Zone

Agro ecology refers to the study of the relation of agricultural crops and environment (Chhatwal, 1996). There are 30 (thirty) agro-ecological zone in Bangladesh. The study area belongs in AEZ-5 and AEZ-12. AEZ-5 is lower Atrai Basin. This region comprises the low lying are between the Barind tract and the Ganges river flood plain. Smooth low lying basin land occupies most of the region. Dark grey, heavy, acidic clays predominate. Seven general soil types occur in the region; but Non calcareous Dark Grey Floodplain soils cover most of the area. Organic matter and fertility status are moderate. Locations of this zone are Naogan and Natore districts and parts of Rajshahi, Bogra and Sirajgonj districts. AEZ-12 is Low Ganges River Floodplain. The region comprises the eastern half of the Ganges river floodplain which is low lying. The region has a typical meander floodplain landscape of brad ridges and basins. Soils of the region are silt loams and silty clay loams on the ridges and silty clay loams to heavy clays on lower sites. General soil types predominantly include calcareous Dark Grey and Calcareous Brown Floodplain soils. Organic matter content is low in ridges and moderate in the basins. Soils are calcareous in nature having neutral to slightly alkaline reaction. General fertility level is medium. Locations of this zone are Natore, Pabna, Goalanda, Faridpur, Madaripur, Gopalgonj and Sariatpur, easter part of kusthia, Magura, and Narail, northern Barisal, and South-Western part of Manikgonj (BBS, 2004)

Specific objectives	Variable/ indicators	Data analysis	Data Source	Assumed result
To know the socio-economic condition in terms of development of the rural people	Age, Occupation, Education, Income, Expenditure, opportunity, Savings, Property	**Qualitative and Quantitative**	**Primary**	Rural people is being conscious and the life style of rural people has been changed
To know the land tenure system as well as ownership in the rural areas	Land ownership, Leased system, Mortgage system	**Quantitative**	**Primary**	The nature of agrarian structure has been changed
To identify the nature of agricultural production and change	Crop production, use of fertilizer, irrigation, use of pesticide, risk of agriculture, Ground water level	**Quantitative**	**Primary**	Agriculture production has been changed in nature
To investigate the nature of ago-ecological system	Soil quality, useful animal / insects	**Quantitative**	**Primary**	Agro-ecological system has been degraded
To find out the impact of climate on agriculture	Crop production and expenditure, Crop preservation and marketing	**Quantitative**	**Primary**	Natural calamities creates obstacle in agricultural production

Fig- 07: Logical framework matrix of the study

3.6 Operational Definition of the Concepts

3.6.1 Agriculture

Agriculture is the science of cultivating soil so as to produce economic crops and demanding great knowledge and skill in its scientific, commercial and artistic aspects. Very broadly the term is applicable to include both pastorcil and arable farming, even though the trend is some what towards the latter (Chhatwal, 1996:10). According to Yousoof (1982), "Agriculture includes crop production, fisheries, forestry, livestock etc." In this study agriculture is meant only crops production.

3.6.2 Agricultural Change

Agricultural change refers not just to the difference between the plantings 10,000 years ago and today's computerized, industrialized, genetically engineered production systems; agricultural change occurs on a daily basis, as farmers in every country of the world make decisions about what, where, and how to cultivate. The importance of the topic goes well beyond how much food is produced, how much money is made, and how the environment is affected: agriculture is intimately linked to many institutions in every society, and to population. In this study agricultural change means the changes of the stages of production, post production and pattern of cropping system.

3.6.3 Development

Development means, improvement of socio-economic condition through comprehensive economic (agricultural and other related rural activities), social, cultural development including education, health, human resource. In this study development means the improvements of all developmental issues particular on income, occupation, education, savings, housing pattern and opportunities in the study area.

3.6.4 Rural Development

Rural development means, improvement of socio-economic condition through comprehensive economic (agricultural and other related rural activities), social, cultural development including education, health, human resources (Yousoof , 1982). In this study rural development means improvement of socio-economic condition such as agricultural activities, income, savings, education, occupation, housing pattern and opportunities.

3.6.5 Problems

Problems mean which creates obstacle in any activities. In this study problems are meant any obstacles in agricultural change and development of the rural people.

3.6.6 Prospects

Prospects mean any probabilities in any sectors. In this study prospects are meant the probable activities in agricultural change and rural development.

3.6.7 Household

A household means a group of persons normally living together and eating in one mess (i.e. with common arrangement of cooking) with their dependents, relatives, servants etc. A household may be a one person household or a multi-person household. In other words, when a group of persons living together generally maintains a family or family like relations and take meals from the same kitchen is termed as a household. Popularly, it is described as “khana”. In this study households means those who takes their meal from a single kitchen and cooking pots.

3.6.8 Food Security

Food security is commonly regarded as the ability to meet target consumption levels in the face of fluctuating production, price, and incomes (Rounasset , 19820). Security ensures the peace and prosperity of the human life and society as well. Food security[2] helps the country’s people food consumption. In this study food security means the sufficient food availability to the respondents and country people as well.

3.7 Summary

On the basis of the subject matter of the study, study area is selected carefully. There are three research methods like social survey, case study and participatory rural appraisal (PRA) used in this study. Different techniques and tools of these methods are used to collect data. Tabulation, graphical presentations are used where necessary. Data also collected through KII. For the better understanding of the study operational definitions of the concepts are made for understanding clear in the study.

End Note

[1]According to Krejcie and Morgan (1970) chart:

Table: Guide to Minimum Sample Size (95% confidence level, +/- 5% margin error)

Population Size	Sample Size	Population Size	Sample Size
10	10	550	226
20	19	600	234
40	36	700	248
50	44	**800**	**260**
75	63	900	269
100	80	1,000	278
150	108	1,200	291
200	132	1,300	297
250	152	1,500	306
300	169	3,000	341
350	184	6,000	361
400	196	9,000	368
450	207	50,000	381
500	217	100,000+	385

[2.]Talukder (2005) said, “Food security is defined as access to adequate and safe food by all people at all times for maintaining an active and healthy life.

CHAPTER – FOUR

SOCIO-ECONOMIC STRUCTURE

4.1 Introduction

Socio-economic indicators are important for measuring the development of the rural people. Social issues like religion, marital status, occupation, education, members of the households and their data, housing pattern are included in the study. On the other hand, yearly income, sources of income, yearly expenditure, yearly savings are included in the economic issues in the study. These are almost depending on agricultural production in the study area. How and in which way agricultural problems and prospects influence on their development as well as socio-economic indicators are discussed in the study.

4.2 Age

Age is important for agricultural as well as any activities in the rural areas. Usually the middle age people are more active, sincere and energetive than other age like younger and aged people.

Table No. 01

Analysis of data on age of the respondents

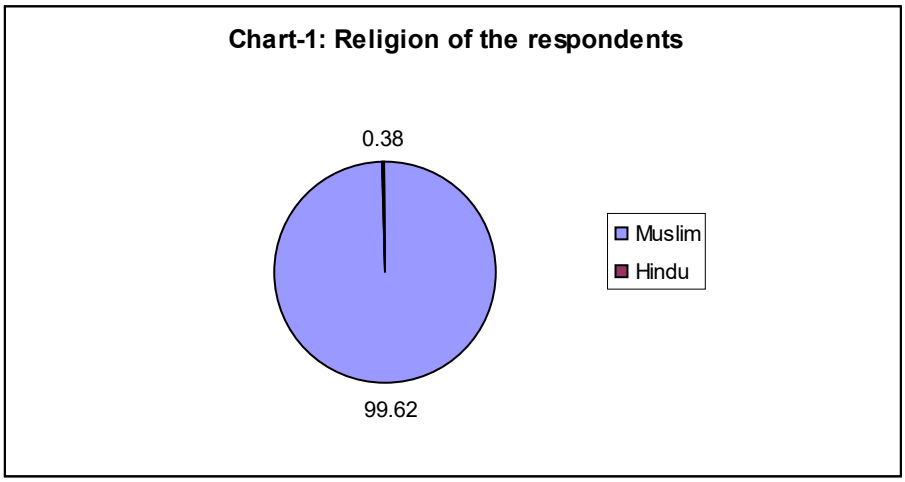
Age (Year)	Frequency (F)	Percentage (%)	X (Mid value)	FX
15-20	01	0.38	17.50	17.50
20-25	02	0.75	22.50	45.00
25-30	19	7.17	27.50	522.50
30-35	12	4.53	32.50	390.00
35-40	37	13.96	37.50	1387.50
40-45	60	22.65	42.50	2550.00
45-50	54	20.38	47.50	2565.00
50-55	33	12.45	52.50	1732.50
55-60	24	9.06	57.50	1380.00
60-65	13	4.91	62.50	812.50
65+	10	3.77	67.50	675.00
Total	265	100.00		12077.50

(*Upper limit is included*)

Data sow that most of the respondents belong in 40-45 years and within 50 years due to the familial background as well. In rural areas, people are separated after marriage. As a result oldest people are decreasing in the family who are mostly found in joint family. Those who are aged can help their knowledge and experience for the development of family and agricultural production. The average age of the respondents is 46 years in the study area.

4.3 Religion

Religion is belief in supernatural being. The man who belief in a religion he respect and practice his respective religious activities. Religious activities help to establish social solidarity.



In Bangladesh, most of the people are Muslims that is also found in the study area. Once upon a time the rate of Hindus was higher but not more than Muslims. Many fishermen who were Hindus live at the study area. At present no Hindu fishermen are found in the study area due to scarcity of fish, lack of opportunities which help to development them, and for the betterment of their life, they migrated from the study area. They chose the place where the favorable environment is found within the country and very few are abroad.

4.4 Marital Status

Marriage is a social bond that plays significant role to control the society and social relationship is enhanced through the marriage.

Table No. 02

Analysis of data about marital status of the respondents

Marital Status	Frequency (F)	Percentage (%)
Married	264	99.62
Unmarried	01	0.38
Total	265	100.00

Data show that most of the respondents are married. Women play a vital role in the agricultural activities from the starting to ending in different ways. The man who is capable to feed his wife can easily marry any one. The attitudes towards marriage are part and parcel of life. So the man who is mature don't want to delay marry.

4.5 Occupation

Occupation is the source of income which is also the social status in the society. Occupational diversity is found in the study area. People are engaged in various occupational activities. There are 10 (ten) occupational classes are found among the respondents where 05 (five) occupational classes are found among the respondent's father and grand father. Agriculture based living was very high among the respondent's father and grand father and still most of the respondents depend on agriculture. Agricultural production and fishing help to take the respective occupation. Other occupational opportunities are creating in the study area which is also help to take various occupations.[1] The rate of taking secondary occupation is very high among the respondents than respondent's father and grand father. It implies that social mobility is creating in the rural areas. Agriculture base business like workshop, welding business are enhancing in the study area. The primary school teacher, high school teacher, college teacher, vocational teacher, madrasa teacher are in the service class. There is a market in the study area. This market is

creating new occupational opportunities. The men who are being able to get surplus money from the agriculture they can easily invest any non-agricultural activities in the market both in temporal or permanently. Rural doctors, tailors have been developed for the market, and various types of business opportunities are also creating due to market in the study area.

Table No. 03

Analysis of data about occupation

Types of Occupation		Respondents	Respondent's Father	Respondent's Grand Father
Primary	Agriculture	199 (75.09)	203 (76.60)	230 (86.79)
	Fisherman	22 (8.30)	22 (08.30)	22 (08.30)
	Service	21 (07.92)	10 (3.77)	04 (1.51)
	Business	14 (05.28)	29 (10.95)	04 (01.51)
	Laborer	04 (01.51)	01 (0.38)	05 (01.89)
	Imam	01 (0.38)	--	--
	Moazzen	01 (0.38)	--	--
	Tailor	01 (0.38)	--	--
	Rural Doctor	01 (0.38)	--	--
	Carpenter	01 (0.38)	--	--
Secondary	No Occupation	117 (44.15)	164 (61.88)	181 (68.30)
	Agriculture	39 (14.72)	37 (13.96)	09 (03.40)
	Fisherman	13 (4.91)	27 (10.19)	30 (11.32)
	Service	04 (1.51)	--	--
	Business	89 (33.58)	28 (10.57)	25 (09.43)
	Laborer	03 (01.13)	09 (03.40)	20 (07.55)

4.6 Problems of Taking Occupation

Occupation can help the development of social status and life style. Occupational opportunities are very high in the urban areas than in the rural areas. So some problems are found in the study area.

Table No. 04

Analysis of data regarding the problems of taking occupation of the respondents

Problems	Frequency (F)	Percentage (%)
Financial Crisis	120	45.28
Lack of Opportunities	216	81.51
Problems of Communication	205	77.36
Lack of Consciousness	47	17.74
Lack of Training	155	58.49

Most of the respondent's opinion is that the main problem of taking occupation is the lack of opportunities. The study area is in the *Chalon Beel* area where no industry or employment opportunity without schools and colleges. Communication is a problem of taking occupation like rickshaw puller, van puller and short term business. Farmers are producing crops without any training from generation to generation. But training on fisheries, poultry, livestock, cottage and so one may play important role in taking new occupation in the study area. Financial crisis is also a problem in taking occupation especially in the fishing community. The laborer class is also facing such type of problem. The marginal farmers, small business man are not gating chance to take occupation for their financial crisis. Some one does not know how to develop their occupation and taking new occupation. This is the symbol of the lake of consciousness.

4.7 Prospects of Taking Occupation

Prospects make hope for the development and progress that depend on opportunities which are comparatively poor in the rural areas.

Table No. 05

Analysis of data about the prospects of taking occupation of the respondents

Prospects	Frequency (F)	Percentage (%)
High Yielding Crops Production	246	92.83
Multiple Crops Production	259	97.74
Reformation of Road	216	81.51
Arrangement of Training	14	5.28
Financial Solvency	145	54.72

Few years ago local crops produced in the study area that make poor amount of production per acre. At present high yielding crop production and modern varieties are produced that make high production per acre which helps to more profit that play role to becoming financial solvency. Financial solvency helps to invest money in business, agriculture and other occupational activities. Almost thirty years ago single crop was produce in the study area; now multiple crops are produced that creates occupational opportunities for laborer and farmers. Road communication is developing in the study area with bridge and culvert. Arrangement of training can help to take new occupational opportunities. Respondents are very interested to take training for their betterment of livelihood and socio-economic status as well.

4.8 Education

Education is the backbone of a nation and an educated man becomes a conscious and creative man. Now-a-days education helps to take occupation and development of the rural people of Bangladesh.

Table No. 06

Analysis of data about education

Types of Education	Respondents	Respondent's Father	Respondent's Grand Father
Illiterate	16 (06.04)	79 (29.81)	230 (86.79)
Primary	104 (39.24)	116 (43.78)	29 (10.94)
Secondary	101 (38.11)	55 (20.75)	05 (01.89)
Higher Secondary	10 (03.78)	05 (01.89)	01 (0.38)
Graduate/Honours	18 (06.79)	07 (02.64)	--
Masters	12 (04.53)	02 (0.75)	--
Kamel	01 (0.38)	01 (0.38)	--
Higher (B.Ed/M.Ed)	03 (01.13)	--	--
Total	265 (100.00)	265 (100.00)	265 (100.00)

Above table shows that illiterate rate is so high among the respondent's grand father and fathers of the respondents. Most of the respondents acquire primary and secondary education. Fewest got chance to take graduate and masters degree due to lack of conscious of their parents, financial crisis, not self interest and so one. Though, the rate of higher education among the respondents is low, but comparatively higher than their father and grand father. The respondents who are higher educated they are involved in different services. Their knowledge and consciousness help to agricultural production more.[2] Some problems are found in taking education by the respondents which are also the obstacle of their development. Rural people are not so concern their children on education. Thy know how to cultivate their land well. In the study area, financial solvency depends on agriculture. In the education time of the respondents most of their parents produced local crops that was low production rate per acre. So, financial crisis was a problem on their education. Once upon a time chalon beel was a remote area where communication was a serious problem. In rainy season, only boat was the communicating way and in summer season, people used to walking, cycle, and bull

cart. But it was too tough to go out side the home if rain comes in the summer season. The educational institutions were not nearer to the respondent's village so that they could not take education.

4.9 Number of Members of the Households

Number of family member of the households is important for the development of the respective households. The opportunities in rural areas are bit little than in the urban areas.

Table No. 07

Analysis of data about the number of members of the households

Number of Members	Frequency (F)	Percentage (%)	X	FX
2-3	65	24.53	2.50	162.50
4-5	69	26.04	4.50	310.50
6-7	109	41.13	6.50	708.50
8-9	14	05.28	8.50	119.00
10+	08	03.02	10.50	84.00
Total	265	100.00		1384.50

Most of the households are made with in 6-7 members. 10+ members are very few in the study area. The average household's members are 6 in number.

4.10 Head of the Households

Usually head of the households is the prime earner in the study area. Sometimes father or mother of the respondent's becomes head of the households due to honor and respect.

Table No. 08

Analysis of data about the head of the households

Head of the households	Frequency (F)	Percentage (%)
Respondents	254	95.85
Respondent's Father	08	03.02
Respondent's Mother	03	01.13
Total	265	100.00

Table shows that most of the respondents are head of the households and they are the main earner and active workers in their households. A very few are head of the households besides the respondents like their father and mother. Head of the households bears all responsibilities of their households. Head of the households play significant role in taking any decision in their domestic activities.

4.11 Age of the households Members

Age of the household's members is different from one another that starts from the child to the old aged persons.

Table No. 09

Analysis of data about the age of the household's members

Age (Years)	Frequency (F)	Percentage (%)	X	FX
>5	68	06.07	2.50	170.00
5-10	123	10.98	7.50	922.50
10-15	127	11.34	12.50	1587.50
15-20	198	17.68	17.50	3465.00
20-25	91	08.13	22.50	2047.50
25-30	122	10.89	27.50	3355.00
30-35	69	06.16	32.50	2242.50
35-40	75	06.70	37.50	2812.50
40-45	88	07.86	42.50	3740.00
45+	159	14.19	47.50	7552.50
Total	1120	100.00		27895.00

(*Upper limit is included*)

Data show that most of the household's member's age is 15-20 years. Second highest is 45+ years. The average age of the households' members is 25 years. In agricultural production this age is very important for energy and other activities which are significant for more production and profit. On the other hand within the average age is significant for taking education by the children of the respondents.

4.12 Occupation of the Households Members

Occupation is the source of income which is also the social status in the society and its diversity is found in the study area.

Table No. 10

Analysis of data about the occupation of the household's members

Occupation	Frequency (F)	Percentage (%)
Child	201	17.95
No Occupation	89	07.95
Housewife	264	23.57
Students	408	36.43
Agriculture	55	4.91
Service	34	03.04
Fisherman	18	01.60
Business	41	03.66
Laborer	10	0.89
Total	1120	100.00

This data represent the members of the households besides the respondents. In the households level some are child, housewife, without occupational status and students who are not earner in their position. Very few are engaged in different occupations. Occupational opportunities are limited in the study area that is the obstacle to take new occupation. Most of the time, the occupation of the household's member is similar with the respondents.

4.13 Education of the Households Members

Education is the backbone of a nation. An educated man becomes a conscious and created man. Now-a-days education helps to take occupation and development of lifestyle in rural areas of Bangladesh.

Table No. 11

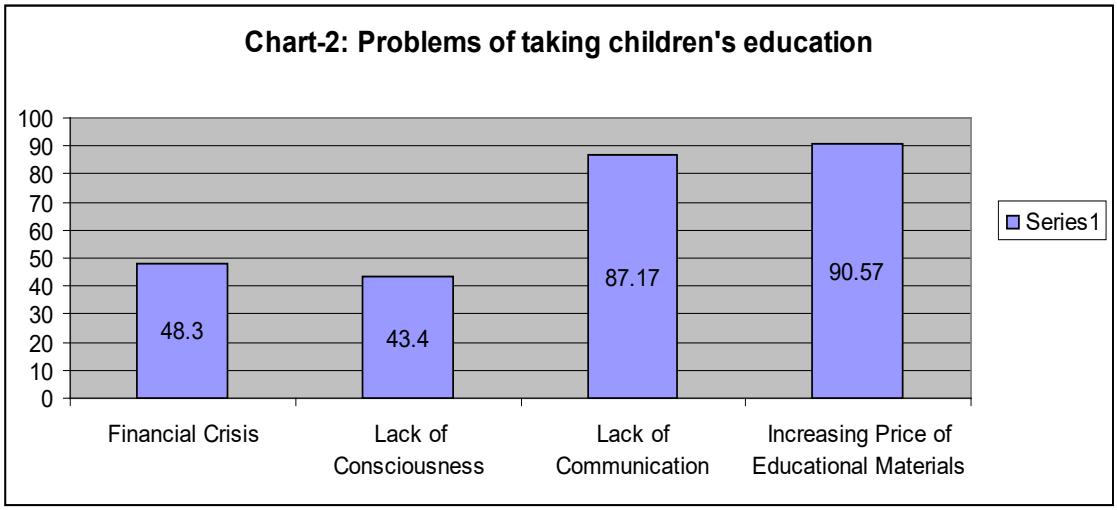
Analysis of data about the education of the household's members & children

Education	Households Members	Only Children
Illiterate	157 (14.02)	107 (12.74)
Child	201 (17.95)	201 (23.93)
Primary	242 (21.61)	145 (17.26)
Secondary	315 (28.13)	210 (25.00)
Higher Secondary	112 (10.00)	109 (12.98)
Graduate	63 (05.62)	49 (05.83)
Masters	29 (02.58)	19 (02.26)
Kamel	01 (00.09)	--
Total	1120 (100.00)	840 (100.00)

Table shows that many of the household's members are illiterate where this rate is low in their children. Over all educational scenarios is clear that children are more educated than their parents due to consciousness of both parents and children.

4.14 Problems of Taking Children's' Education

There are some problems in children's education that creates obstacle on taking children's education.



Financial crisis is found in some respondents that create lack of opportunities to earn more. Lack of consciousness is found more in the fisherman, laborer and marginal farmers. Communication is another problem that is different in rainy and summer season. In rainy season boat is only way to go one another even one *para* to another *para* that is risky for the child who does not know how to swim. In summer season road becomes clay with muddy for raining that create slippery which is also risky for the children. Increasing price of educational materials like books, paper, pen, pencil etc. are a great problem on taking education for the poor and marginal farmers.

4.15 Prospects of Taking Children's Education

Though some problems of taking education that create problems but prospects help to educational opportunities to the children in the study area.

Table No. 12

Analysis of data about the prospects of taking education

Prospects	Frequency (F)	Percentage (%)
Increasing Awareness	137	51.70
Role of Media	190	71.70
Financial Solvency	145	54.72
Co-operation of Teachers	182	68.68
Competitive Attitude	206	77.74

People are awaking in different ways like their social mobility, enhancing social relationships and so one. Awareness is also creating on watching the learners of their neighbor. Electronic and print media are playing significant role to become enthusiastic on education. Financial solvency is creating through agricultural production and other occupational opportunities that help to create educational opportunities. School, college or madrasa has almost each village which is creating a competition to each other and looking for students more in their respective institutions. As a result teachers are very co-operative minded and helpful to ensure

better education to the students with their educational competition between the institutions. Not only respondents or households members but also the neighbor or relatives are very conscious regarding education. A competitive attitude is found among the respondents and children on taking education and good results. The men who are in the well position their professional life by dint of education is also encourage to the learners in the study area.

4.16 Dropout the Children

Some one could not continue their education due to many reasons that is why a few number of learner failure from taking their education which was their basic right.

Table No. 13

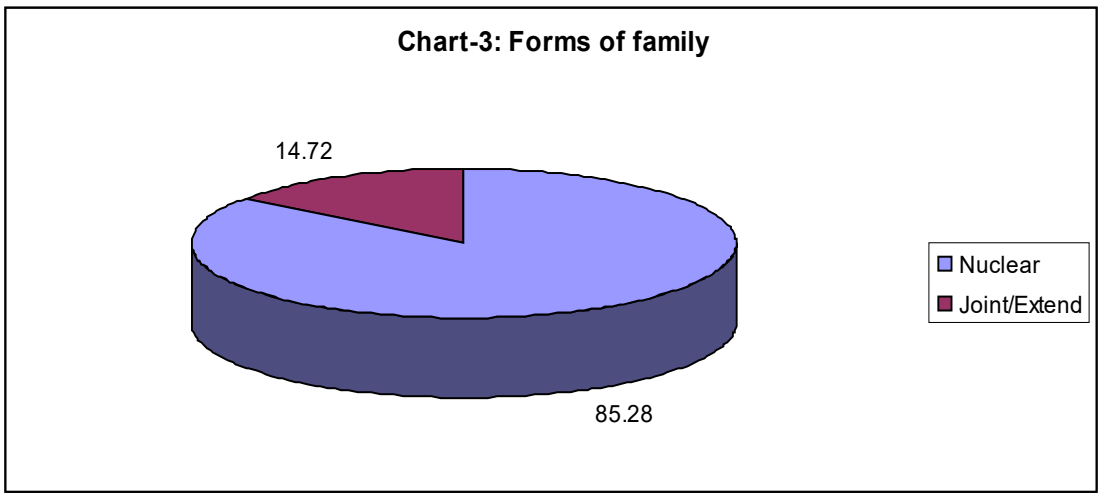
Analysis of data about the dropout of the children

Rate of Dropout		**Causes of Dropout**	**Frequency (F & %)**
Yes	No	Financial Crisis	52 (19.62)
52 (19.62)	213 (80.38)	Lack of Awareness	52 (19.62)
		Marriage (especially daughter)	11 (04.15)
		Near after Could not Continue or Complete	52 (19.62)
		Money for Job	52 (19.62)
		Co-operation for Father's Works	42 (15.85)
		Less Interest of Children	50 (18.87)

Financial crisis is more in the fisherman, laborer, marginal farmer, and lack of awareness is found among the respondents. Early marriage especially for girl makes obstacle for taking education. Some one think that what would be taken education near after could not continue or successfully complete and money will be needed for job that could not be paid by them. Someone dropped out for helping their father works. This co-operation is some how essential for fishing and agricultural activities.

4.17 Forms of Family

Family plays an important role for the socialization and other activities which is necessary for morality and personality development of the children.



Most of the families are nuclear which creates by one generation. The rate of joint family is low that creates by two or more generations. Once upon a time joint family was more than nuclear due to the necessity of their respective family that helps to smooth familial activities and establishing social bond and socialization of the children as well. Now nuclear family is creating for necessity of the respondents which is far different from past. It is creating after marriage of the person. In rural areas most of the time nuclear family is established due to miss understanding between mother-in-law and daughter-in-law. In this time husband or son become helpless and become separate for the betterment of the two.

4.18 Types of Housing

House is the symbol of the development in the rural area in terms of its nature and number. In this matter the differences are found among the respondents, respondent's father and respondent's grand father.

Table No. 14

Analysis of data about the types of housing

Owner of the House	Clay+ Straw	Clay+ Tile	Clay+ Tin	Fence+ Chon	Fence+ Tin	Brick+ Tin	Brick+ Roof
Respondents	11 (04.15)	13 (04.91)	154 (58.11)	03 (01.13)	56 (21.13)	44 (16.60)	04 (01.51)
Respondent's Father	102 (38.49)	81 (30.57)	61 (23.02)	15 (05.66)	27 (10.19)	31 (11.70)	--
Respondent's Grand Father	204 (76.98)	24 (09.06)	18 (06.79)	17 (06.42)	12 (04.53)	--	--

(Taken multiple answer)

The study area is in the middle *Chalon Beel* that is filled up by water in the rainy season which is looks like an island not only the village but also the each *para* as well. The house of the respondent's is made by clay and tin mostly. Tin means corrugated iron-sheet used for roofing. A little numbers are clay with straw and clay with tile. Tile means unglazed clay brick for roofing. Very few are fence with chon. Straw or chon means a kind of tall grass suitable as a thatching material. Another is fence with tin, break with tin and brick with roof. The use of brick is increasing day by day due to longevity and financial solvency as well. On the other hand clay is diminished by rat in the study area whereas brick made house is comparatively secure than others. The use of brick was very rare among the respondent's grand father where little used among the respondent's father. The rate of clay with straw was very high among the respondent's father and grand father.

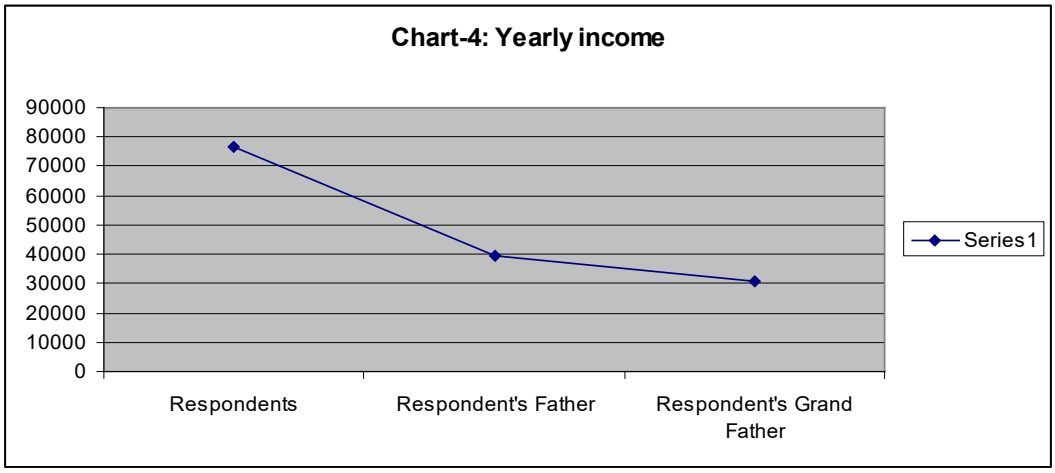
4.19 Income

The main source of income comes from occupation and land in rural areas. It is varied on the basis of difference of land among the respondents.

Table No. 15

Analysis of data about the yearly income

Income (Taka)	X	Respondents		Respondent's Father		Respondent's Grand Father	
		F (%)	FX	F (%)	FX	F (%)	FX
>10,000	5000	00	00	00	00	03 (01.13)	15000
10,000-20,000	15000	05 (1.89)	75000	29 (10.94)	43500	114 (43.02)	1710000
20,000-30,000	25000	02 (0.75)	50000	88 (33.21)	2200000	49 (18.49)	1225000
30,000-40,000	35000	09 (03.40)	315000	21 (07.92)	735000	43 (16.23)	1505000
40,000-50,000	45000	21 (07.92)	945000	75 (28.30)	3375000	24 (09.06)	1080000
50,000-60,000	55000	25 (09.43)	1375000	19 (07.17)	1045000	21 (07.92)	1155000
60,000-70,000	65000	28 (10.57)	1820000	12 (04.53)	780000	04 (01.51)	780000
70,000-80,000	75000	26 (09.81)	1950000	07 (02.65)	525000	02 (0.75)	150000
80,000-90,000	85000	30 (11.32)	2550000	03 (01.13)	255000	01 (0.38)	85000
90,000+	95000	119 (44.91)	11305000	11 (04.15)	1045000	04 (01.51)	380000
Total		265 (100.00)	20385000	265 (100.00)	10395000	265 (100.00)	8085000



The above table shows that most of the respondents earn money more than 90,000 taka per year. Per year respondent's fathers income is mostly from 20,000 to 30,000 taka. Respondent's grand father income was mostly from 10,000 to 20,000 taka per year. The average income of the respondents is 76,925.00 taka per year. The average income of the respondent's father was 39,225.00 taka per year and the average income of the respondent's grand father was 30,509.00 taka per year. These income scenarios imply that the average income of the respondents is higher than their father and grand father. The respondents said that their lifestyle is far better than their father and grand father.

4.20 Problems of Increasing Income

There are some problems that creates obstacle for achieving more income and these problems are almost same for all respondents.

Table No. 16

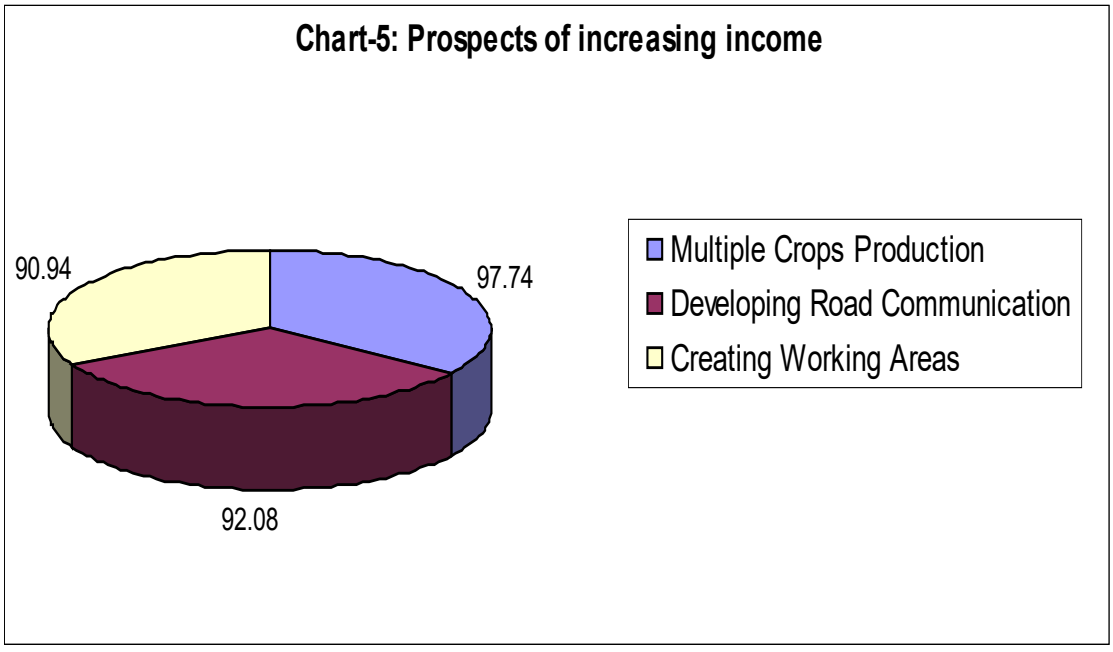
Analysis of data about the problems of increasing income

Problems	Frequency (F)	Percentage (%)
Low Crops Price	246	92.83
High Production Expenditure	259	97.74
Lack of Opportunities	190	71.70
Lack of Communication	199	75.09
Up Down in Rice Business	11	4.15
Scarcity of Fish	77	29.06
Suddenly Low price of Fish	77	29.06

High production expenditure and low crops price is a major problem in the study area especially in the harvesting period. Those who can wait few months they can get chance to profit more. Most of the respondents fail to preserve rice for high price during the month of November to January. It is possible for rich respondents who have no credit. On the other hand the poor and marginal farmer can't preserve their crops that obstacle for earning more profit. Lack of opportunities of more income is found in the study area. Lack of communication for transportation is also found in the study area. Those who make and sale rice they face up down rice price which is obstacle for more income. Scarcity of fish and suddenly low price of fish create a problem for the fisherman and seasonal fisherman. Once upon a time different species of fish were found more and fishing community is developed in the study area. Seasonal fisherman catches fish for increasing income. Now fish scarcity and sometimes low price especially in the October- November create problems for more income.

4.21 Prospects of Increasing Income

Though there are some problems found in the income opportunities, some prospects are also found in the study area which helps to encourage more production and working environment.



Few years ago single crop produced in the study area. Now, at least two crops are produced in the study area that helps to earn more money. High yielding varieties of boro is produced more. Road communication is developing by making underwater road, culvert and bridge that will help to marketing their agricultural production and create occupational opportunities. Multiple crops production and development of road communication are creating new working opportunities that are creating labor demand and economic solvency to the workers.[3]

4.22 Expenditure

Expenditure depends on income. It is said that if income is high then expenditure is also high, on the other hand if expenditure is high then income is high due to the earning demand of the people.

Table No. 17

Analysis of data about the yearly expenditure of the respondents

Expenditure (Taka)	**Frequency (F)**	**Percentage (%)**	**X**	**FX**
>10,000	01	0.38	5000	5000
10,000-20,000	09	03.40	15000	135000
20,000-30,000	17	06.42	25000	425000
30,000-40,000	44	16.60	35000	1540000
40,000-50,000	58	21.89	45000	2610000
50,000-60,000	32	12.08	55000	1760000
60,000-70,000	13	04.90	65000	845000
70,000-80,000	14	05.28	75000	1050000
80,000-90,000	14	05.28	85000	1190000
90,000+	63	23.77	95000	5985000
Total	265	100.00		15545000

Table shows that most of the responds expend their money more than 90,000 taka. Very few expend less than 20,000 taka per year. The average expenditure is high

among the respondents who are trying to educate their children. Expectation of social demand creates necessity to expend more money. They expend their money for their domestic needs and familial activities which imply the development of the rural households. The average expenditure of the respondents is 58,660.00 taka per year.

4.23 Savings

Savings is fully depending on income and expenditure of the respondents. The rate of savings in the study area is low.

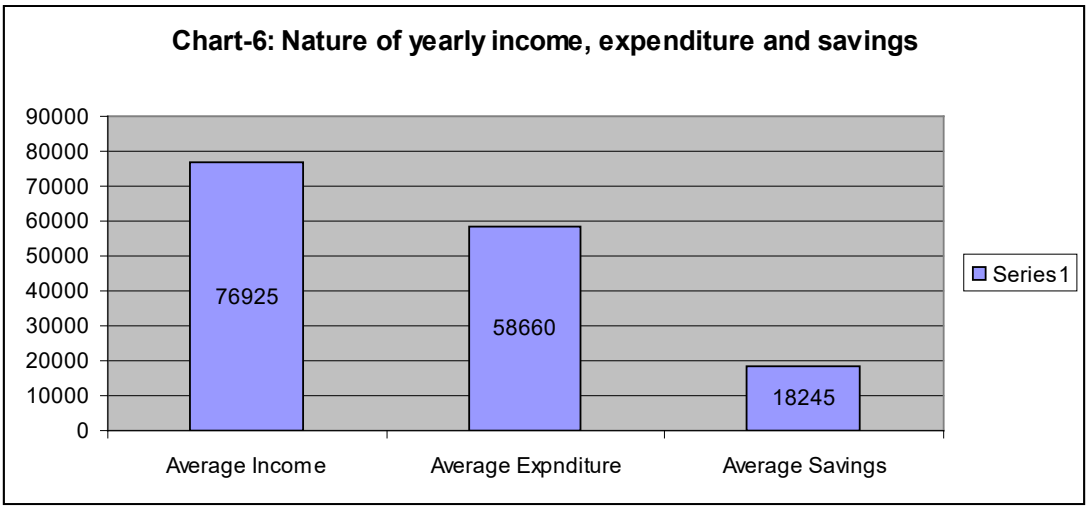
Table No. 18

Analysis of data about the yearly savings of the respondents

Savings (Taka)	Frequency (F)	Percentage (%)	X	FX
0	30	11.32	00	00
>10,000	41	15.47	5000	20500
10,000-20,000	127	47.93	15000	1905000
20,000-30,000	35	13.21	25000	875000
30,000-40,000	09	3.40	35000	315000
40,000-50,000	08	3.02	45000	360000
50,000-60,000	02	0.75	55000	110000
60,000-70,000	01	0.38	65000	65000
70,000-80,000	02	0.75	75000	150000
80,000-90,000	10	03.77	85000	850000
Total	265	100.00		4835000

From the above table 06.04 percent respondents have no savings who are poor laborer and fisherman. Most of the respondents can save money 10,000 to 20,000 taka per year. Those who have large amount of land can get chance to save more money. The average savings is 18,245.00 taka per year of the respondents. The

average income, expenditure and savings per year of the respondents are given below by chart:



4.24 Summary

Most of the respondents are within 50 years old and Muslim in the study area. Almost all are married. There are ten occupational classes like agriculture, fisherman, service, business, laborer, imam, moazzen, tailor, rural doctor and carpenter found in the study area, some one have secondary occupation. They have some problems in taking occupation and have been created opportunities to shifting new occupations for their live setting. Primary and secondary education rate is high among the respondents where primary education rate is high among the respondent's father and illiterate rate is high among the respondent's grandfather. The education rate is higher among the children than respondents. Though there are some problems in taking children's education, some prospects have been created in the study area on taking education for their children. Few drops out cases are found in the study area due to different aspects including helping the respondent's works. Most of the respondents are the head of the household due to wage earner. The household's members are involved in different occupation which is almost similar to the respondent's occupation. Nuclear family is more than joint family. Housing pattern of the respondents has been developed in the study area. Income of the respondents has been increased for the changing socio-economic situation. Problems in earning more income are found in the study area. On the other hand

opportunities of more income have been increased in the study area. Their expenditure has been increased with increasing income and savings is possible for the respondents in the present context.

The average age of the respondents is 46 years. Most of the respondent's (22.65%) age is within 40-45 years. The 99.62 percent respondents are Muslims and also 99.62 percent respondents are married. The 75.03 percent people of the study area are involved in agriculture. We found that the 76.60 percent respondent's father was involved in agriculture and 86.79 percent respondent's grand father was involved in agricultural activities traditionally. Respondents gave their opinion on problems of taking occupation of which 45.28 percent is financial crisis, 81.51 percent is lack of opportunities, 77.36 percent is problems of communication, 17.74 percent is lack of consciousness and 58.49 percent is lack of training. They also gave their opinion on prospects of taking occupation of which 92.83 percent is high yielding crops production, 97.74 percent is multiple crops production, 81.51 percent is reformation of road, 5.28 percent is arrangement of training and 54.72 percent is financial solvency. Most of the respondents (39.24%) are primary educated and 06.04 percent respondents are illiterate. In the case of 29.81 percent respondent's father was illiterate where 86.79 percent respondent's grandfather was illiterate. The average household's members of the respondents are 6 in number and 95.85 percent respondents are the head of their households. The average age of the household's member is 25 years. In the households members, 17.95 percent is child, 07.95 percent is not involved in any occupation, 23.57 percent is housewife, 36.43 percent is students, 4.91 percent is agriculture, 3.04 percent is service, 1.60 percent is fisherman, 3.66 percent is business and 0.89 percent is laborer. In children's education 12.74 percent is illiterate, 23.93 percent is child, 17.26 percent is primary educated, 25.00 percent is secondary educated, 12.98 percent is higher secondary educated, 5.83 percent is graduated and 2.26 percent is masters. In problems of taking children's education they gave their opinion of which 48.30 percent is financial crisis, 43.40 percent is lack of consciousness, 87.17 percent is

lack of communication and 90.57 percent is increasing price of educational materials. They also gave their opinion in prospects of taking children's education of which 51.70 percent is increasing awareness, 71.70 percent is role of media, 54.72 percent is financial solvency, 68.68 percent is co-operation of teachers and 77.74 percent is competitive attitude. 19.62 percent children are dropped out in the study area. 85.28 percent are nuclear family and 14.72 percent are joint family. Most of the respondents (58.11%) live in the house which is made by clay with tin. In the study area, the respondent's father (38.49%) lived in the house which made of clay with straw and most of the respondent's grandfather (76.98%) lived in the house which made of clay with straw. Some of the respondents live in brick with roof where their father or grandfather had no such type of house. The average income of the respondents is 76,925.00 taka per year. The average income of the respondent's father is 39,225.00 taka per year and the average income of the respondent's grand father's is 30,509.00 taka per year. They gave their opinion on problems of increasing income of which 92.83 percent is low crops price, 97.74 percent is high production expenditure, 71.70 percent is lack of opportunities, 75.09 percent is lack of communication, 4.15 percent is up down in rice business, 29.06 percent is scarcity of fish and 29.06 percent is suddenly low price of fish. They also gave their opinion on prospects of increasing income of which 97.74 percent is multiple crops production, 92.08 percent is developing road communication and 90.94 percent is creating working areas. The average expenditure of the respondents is 58,660.00 taka per year. The average savings of the respondents is 18,245.00 taka per year.

These socio-economic indicators imply that the developmental opportunities have been created and are creating new opportunities day by day due to the changing agricultural production system in the study area. This agricultural change play significant role on the efforts to development as well as the development of rural people of Bangladesh

End note

[1.] Agriculture related employment opportunities are decreased and people are migrated to the cities as well as foreign countries for the employment (Sarwar, 2007).

[2.] Education should enable a person to deal more effectively with others, with his work, and also with himself (his needs, his feeling, his motives, his past history (Heredero, 1977).

[3.] In crop production, labor activities include seed bed preparation, planting, irrigation, chemical application, and harvesting (Person *et al.,* 1996).

CHAPTER – FIVE

LAND TENURE SYSTEM

5.1 Introduction

Bangladesh is basically agricultural country and almost all the rural population are directly or indirectly associated with agriculture except the occupational groups who live by their traditional occupation. The principal means of production in Bangladesh is land and, therefore, the agrarian population is divided into classes on the basis of ownership and non-ownership of land (Chawdhury, 1982). According to UNDP (2000), Bangladesh is a country of scarce land resources having per capita arable land of only 0.17 acre with a population density of 834 per sq. km. and a per capita food supply of only 2000 kcal (cited in Alam, 2009). The ownership of land is important in the rural areas. Hossain (1991) said, "the ownership of land is of critical importance in rural Bangladesh. Agriculture still occupies a pivotal position in the structure of our economy, though its share in the GDP has shown a declining trend in the last two or to three decades. The economic and the social life of the people revolve round agriculture." Though agricultural GDP is declining, land is the main source in the rural areas. According to Hossain and Bayes (2010), land is the main source of livelihoods in rural Bangladesh. In a country of too many people chasing extremely scarce land, it is the most precious resource that every person wants to own, and does not want to sell even when moving to non-farm occupations. The also said that over the years Bangladesh had been faced with increasing incidence of landlessness and shrinking of arable land. Historically, excessive population pressure on limited land resource base has exacerbated the situation.

5.2 Land

Land is the main source of income as well as economic activities in the rural areas thus people are directly or indirectly depending on land and the demand of land is increasing in terms of purchasing and selling in the study area.

Table No. 19

Analysis of data about the amount of land

Amount of Land	X	Housing (Decimal)		Arable Land (Acre)	
		F (%)	FX	F (%)	FX
0	0	0	0	24 (09.06)	0
> 2	1	42 (15.85)	42	101 (38.11)	101
2-4	3	97 (36.60)	291	97 (36.60)	291
4-6	5	16 (06.04)	80	36 (13.58)	180
6-8	7	39 (14.72)	273	05 (01.89)	35
8-10	9	28 (10.56)	252	01 (0.38)	9
10+	11	43 (16.23)	473	01 (0.38)	11
Total		265 (100.00)	1411	265 (100.00)	627

Data show that all the respondents have housing land yet, only 09.06 percent have no arable land. Most of the respondents have 2-4 decimal housing land. More than 10 decimal housing lands have 16.23 percent respondents. The study area has scarce of both housing and arable land due to the overpopulation and no opportunity to expand their housing land. Moreover all paras are situated along with the ponds. So, they have very few scopes to extend their housing land. Most of the respondents have 2 acre land. Average housing land is 5.32 decimal and arable land is 2.37 acre of the respondents. Average size of land is decreasing due to increasing nuclear family, separation of family, and increasing population day by day.[1] The demand and price of the land is increasing day by day. The men who are working hard, becoming able to earn more money that helps to purchasing the land in the study area.

5.3 Problems of Achieving Land

There are some problems in achieving land that creates obstacle to the development of the respondents which is also related with social status in the rural areas.

Table No. 20

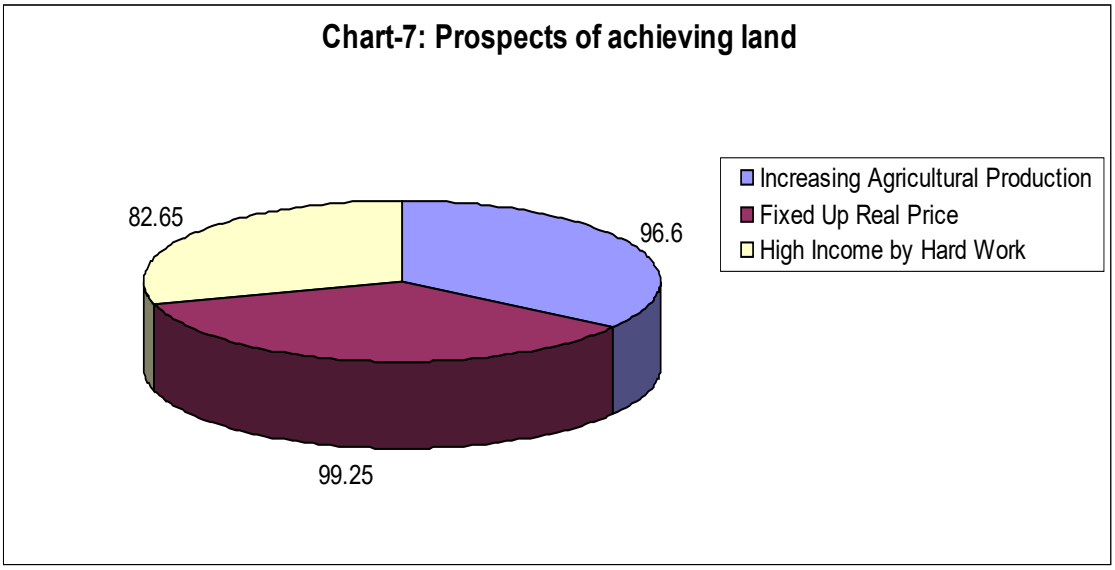
Analysis of data about the problems of achieving land

Problems	Frequency (F)	Percentage (%)
Scarcity of land	253	95.47
High Demand of Buying	258	97.36
High Price of Land	261	98.49
Complexity of Land Ownership	144	54.33
More Competition	137	51.70

Scarcity of land is a major problem in the study area which is creating high demand of land in price and sale. Land is limited but population is increasing year after year, so that land demand is increasing and land man ratio is decreasing.[2] Few years ago, land was sold 60,000 to 1,50,000 taka per acre. Now-a-days it is sold 3,00,000 to 6,00,000 taka per acre. This price depends on the fertility of land and competition among the buyers. Complexity of land ownership like ownership sharing and litigation create problems on achieving land. More competition is found in study area due to the solvency of some respondents. As a result people have money in hand but no purchasable land either housing or arable in the study area. It is found that land seller is one person but buyer is more than one person. Usually people are not interested to sale their land. Yet, those who have very terrible condition or miserable condition in terms of domestic or others need then they sale their land.

5.4 Prospects of Achieving Land

Though there are some problems in achieving land, some prospects are also found in the study area which is creating new opportunities for the respondents.



Increasing agricultural production is a major prospect in the study area. Those who are involving in the crops production are producing high yielding varieties and getting more agricultural production per acre. These more production helps to earn more money per year. Crops price is not stable that create less interest, if crops price is fixed then able to earn more money. Government is playing significant role to fix up real price of the agricultural production but it should be implemented for the respondents. Respondents are trying to hard work to earn more money that is craeating due to multiple crops production, and creating occupational opportunities in the study area.

5.5 Sources of Land Ownership

There are many sources of land ownership that differs from one another. Inherit, purchase, marital and gift are the common sources of land ownership in the study area.

Table No. 21

Analysis of data about the sources of land ownership

Types of Land		Inherit	Purchase	Marital	Gift
Housing (Decimal)	>2	22 (08.30)	38 (14.34)	02 (0.75)	--
	2-4	55 (20.75)	48 (18.11)	02 (0.75)	--
	4-6	20 (07.55)	09 (03.40)	--	--
	6-8	12 (04.53)	34 (12.83)	01 (0.38)	--
	8-10	18 (06.79)	20 (07.55)	--	01 (0.38)
	10+	21 (07.92)	19 (07.17)	05 (01.89)	--
Arable Land (Acre)	>2	36 (13.58)	54 (20.38)	29 (10.94)	--
	2-4	48 (18.11)	64 (24.15)	--	--
	4-6	20 (07.55)	36 (13.58)	--	--
	6-8	02 (0.75)	05 (01.89)	--	--
	8-10	01 (0.38)	01 (0.38)	--	--
	10+	01 (0.38)	01 (0.38)		

(Taken multiple answer**)**

Table shows that housing land mostly comes from inherit and purchase. Very few get chance to acquire land from marriage. Inheritance is made after the death of their parents or fraction with consent of their parents. Purchasing land is possible on the basis of financial solvency of the respondents. The respondents achieved their arable land mostly through purchasing that has been possible for their economic solvency by more agricultural production and hard work of the respective respondents. 10.94 percent respondents achieve arable land from marital way and wife as well.

5.6 Social Class on the Basis of Land Ownership

Social class is based on different socio-economic issues like land ownership in the rural areas that indicates the social status of the people and agrarian class structure as well.[3]

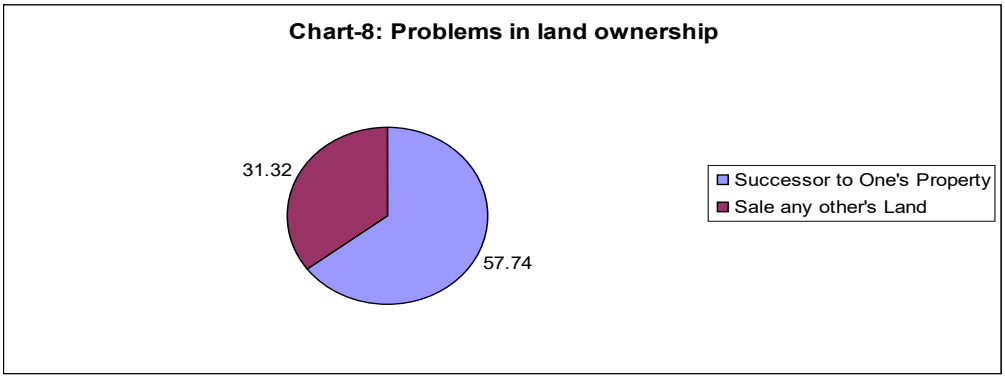
Table No. 22
Analysis of data about the social class on the basis of land ownership

Ownership		Frequency (F)	Percentage (%)
Landless	Landless-1 (those who have no housing and arable land)	--	--
	Landless-2 (those who have housing land but no arable land)	24	(09.06)
	Landless-3 (those who have housing and 0.50 acre arable land)	94	(35.47)
Land owner	those who have housing and more than 0.50 acre arable land	147	(55.47)
Total		265	100.00

From the above table, there is no landless-1 class in the study area because at least all have their own housing land. 09.06 percent respondents are landless-2 of which most of them are fisherman and laborer. Landless-3 respondents are 35.47 percent; most of them are marginal farmers. 55.67 percent respondents are land owner and they have different amount of arable land. Those who have more land, they can earn more money by agricultural production or giving mortgage or lease. They enjoy social status in case of their children education or marriage.

5.7 Problems in Land Ownership

Land based problems are found in the rural area which creates obstacle in land ownership in the study area.



Many successor to one's property establish many ways like in the name of dalil, records etc. These were high in previous year rather found less at present due to consciousness of the rural people. Someone sale one's land to others. It is found among the successor who wants and motivated by someone to create some problems of their relatives. This male practice is still continuing that depending on opportunity of the problems creators. As a result sometimes people become hopeless to purchase land either housing or arable. Many people do not know or aware the subject matter of the land in terms of land management and ownership right.

5.8 Mortgage System

Mortgage and *koat* system are well known to all in the study area. It is contracted between the two parties by 1,20,000.00 taka to 1,50,000.00 taka for at least two years. The amount of mortgage money depends on the demand and qualities of respective land either high or small rates.[4] After two years when the land owner wants to return or cultivate his land he will get chance to reduce 600.00 taka per acre per year from taking contract money. This money is called *khaonti.* A contract is signed in 150.00 taka non-judicial stamp between the land owner and the mortgage owner in presence of few witnesses. Most of the time day laborers or laborers are taking mortgage. They are getting chance to work more and savings as well. On the other hand land owners are keeping mortgage to other due to their children's education, treatments, familial demands and maintaining social status.

5.9 Problems of Mortgage System

Though mortgage system is increasing due to many reasons but some problems are arising in this practice.

Table No. 23
Analysis of data about the problems mortgage system

Problems	Frequency (F)	Percentage (%)
High Rate in Amount	252	95.09
Handover to another Incase of High Rate in Amount	235	88.68
Keeping Lease by Taking Mortgage	110	41.51

Data show that high rate in amount in taking mortgage is a major problem in the study area. Someone handover to another incase of high rate in amount besides previous person that creates problem to the mortgage taker for investing money. Sometimes mortgage takers are not yet ready to take refunding money. It is also found that one person takes mortgage but he give lease to other person that creates clash land owner and mortgage taker or land owner and lease taker.

5.10 Lease System

Lease system is practiced for each year. It is contracted between the two parties by 18,000.00 taka to 21,000.00 taka per acre for one year. The land owners who become failure to cultivate their land they give lease to other man. They are either old aged or no eligible family member to cultivate the land. The rates of lease depend on the price of crops. Besides these, qualities and demand of land play significant role to high or small amount of rates. After cutting the crops new agreements are starting for the next year. Usually contract and amount pay are completed within the Bengali month of Vadra- Ashin. Signing contract in written form found seldom due to oral contract is sufficient between the two parties. On the other hand little amount of money is also a factor not to make written contract.

5.11 Problems of Lease System

There are some problems in lease system which creates in various ways.

Table No. 24

Analysis of data about the problems of lease system

Problems	Frequency (F)	Percentage (%)
More Competition	235	88.68
Less Certainty	137	51.70
Keeping One to Another	78	29.43
Conflict between Children and Parents	94	35.47

More competition in taking lease system is a problem for the lease takers that is desire to the land owners. Lease system is developed for only one year that is not

ensuring for the next year for the same lease taker. Sometimes keeping leases one to another in terms of brother or parents that create conflict between children and parents. A very few cases this conflict go to the court and social relationships become un-expectable.

5.12 Problems of Land Ownership in Agricultural Development

Problems of land ownership in agricultural development are found in different ways in the study area.

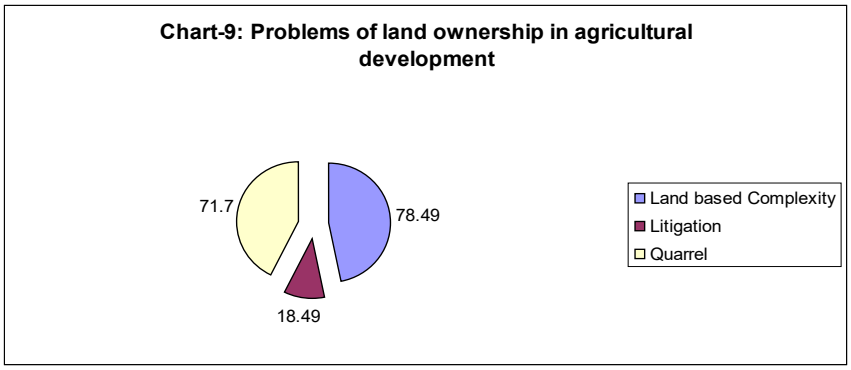


Table shows that land based complexity is created that make obstacle in the development of agriculture. Litigation or case filing is another problem that makes loss of huge amount of money and breaks the social relationships in the rural areas. Once upon a time it was a serious problems and threat as well for the development of agriculture and the people in the rural areas by loosing money and property. Quarrel some conditions are not helpful for the development of agriculture and their livelihood.

5.13 Summary

Land tenure is an important issue in the rural Bangladesh. Land ownership is found on the housing and arable land. Some problems like scarcity of land, high price, land base complexity and more competition are exist in achieving land. Besides these problems, prospects like increasing agricultural production, increasing income that comes from multiple crops production are found in the study area. Land ownership is made by inherit, purchase, marital and gift mostly. There are some social classes observed on the basis of land ownership. Mortgage system and lease system are practiced in different terms and conditions between the two parties. In

some cases problems of land ownership creates obstacle in agricultural development by loosing money and property. More over social relationships becomes unhealthy for this reason.

The average housing land is 5.32 decimal and arable land is 2.37 acre of the respondents. Respondents gave their opinion on problems of achieving land of which scarcity of land is 95.47 percent, high demand of buying is 97.36 percent, high price of land is 98.49 percent, complexity of land ownership is 54.33 percent and more competition is 51.70 percent. On the other hand they also gave their opinion regarding prospects of achieving land of which increasing agricultural production is 96.60 percent, fixed up real price and high income by hard work. 09.06 percent respondents are landless-2, 35.47 percent respondents are landless-3, and 55.47 percent respondents are landowner in the study area. They gave their opinion on problems of land ownership that are successor to one's property is 57.74 percent and sale any other's land is 31.32 percent. Mortgage system is practiced in the study area and it has some problems that are high rate in amount is 95.09 percent, handover to another incase of high rate in amount is 88.68 percent and keeping lease by taking mortgage is 41.51 percent. Lease system is also practiced in the study area that have some problems in which more competition is 88.68 percent, less certainty is 51.70 percent, keeping one to another is 29.43 percent and conflict between children and parents is 35.47 percent. There are some problems of land ownership in agricultural development that are land based complexity is 78.49 percent, litigation is 18.49 percent and quarrel is 71.70 percent.

Agricultural change and development created new opportunities that effect on land tenure as well as land ownership system in terms of encouraging production by the non-ownership class of the rural people in the study area.

End Note

[1.]Hossain and Bayes (2010) said, Land is becoming scarce day by day is indicated by the sharp decline in the average size of land ownership per rural household.

[2.]According to Sarwar (2007), Land is the fundamental resource for the existence of human being. Land is very limited and the population is over growing day by day. Therefore, land to human ratio is decreasing.

[3.]The different categories of persons associated with agriculture and their interrelationships constitute the agrarian class structure (Beteille, 1966).

[4.]A land market and the ability to mortgage land may also promote investment by increasing farmers' access to credit (Feder *et al.,* 1988; Pender and Kerr, 1999).

CHAPTER – SIX

AGRICULTURAL PRODUCTION AND AGRICULTURAL CHANGE

6.1 Introduction

Agricultural production depends on natural resources: land, soil, water, and plant genetic resources (Voegele *et al.,* 2008). The almost same ideas express Freeman. He said agricultural production worldwide depends largely on natural resources such as land, water, pasture, fish, forest, and biodiversity (Freeman, 2008). Although different varieties of crops are grown in Bangladesh, rice is the overwhelmingly dominant crop in terms of acreage and importance as the staple food. Rice alone accounts for about 75 percent of the cropping area in the country (Mainuddin *et al.,* 2011). In Bangladesh, rice production increased over the last three decades after adoption of modern varieties (Alam and Hossain, 1998). On the other hand, cost of rice production has increased during the same period because of more input use and higher input prices (Jabber, *et al*., 2006)

Rerkasem and Thapa (1998) said traditional and new technologies have been adapted to increase productivity, including irrigation, and the use of inputs such as fertilizers and pesticides. According to Yaseen *et al.* (2011), rice being the staple food occupies a central position in the agricultural farming system in Bangladesh. So, agricultural production and change have a remarkable role on developing the agricultural sectors and efforts to development in rural areas of Bangladesh.

In the study area, single and traditional crops produced few years ago but at present multiple crops are produced in many case those repercussions on the development of the rural people. Change is explicitly clear in agricultural production system from selection of seeds to preservation of crops by the respondents. Thus so many problems and prospects of agricultural change that play significant role on income, opportunities, food demand, education, property, domestic needs and other necessary activities of the rural people. There is a noteworthy change in water, seeds, fertilizer and pesticides in the study area that boost to production more and improving lifestyle of the rural people.

6.2 Arable Land of the Respondent

The respondents cultivate agricultural production by their own land, mortgage and yearly lease system.[1]

Table No. 25

Analysis of data about the arable land of the respondents

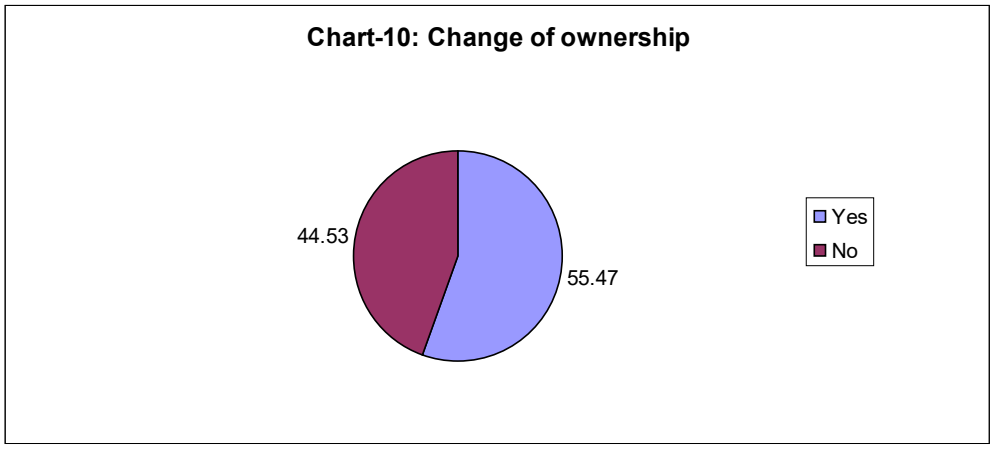
Types of Land (Acre)	Own Land	Mortgage	Yearly Lease
>2	101 (38.11)	05 (01.89)	38 (14.34)
2-4	97 (36.60)	02 (0.75)	20 (07.55)
4-6	17 (06.42)	--	02 (0.75)
6+	07 (2.64)	--	--

(Taken multiple answer)

Most of the respondents produce their agricultural production in their own land, and 2-4 acre. Very few keep mortgage and produce their production. Mortgage system is not widely practiced due to a large amount of money have to pay at a time which is sometimes very difficult to many respondents. Lease system is practiced in the study area that is comparatively easier to the respondents due to a fixed amount of money have to pay in a single year per acre. Those who are financially capable, they cultivate their own land and by taking mortgage and yearly lease system.

6.3 Change of Ownership

Change of ownership in agricultural production is found in the study area in different ways which is increasing day by day.



Once upon a time land owner cultivate their own land and very few amount of land cultivate non-owner. Now many land owners are not interested to cultivate their land due to old aged, lack of opportunities, not present their children at home etc. So, non-owners are getting chance to cultivate land from the land owner and becoming financially solvent. In this cases most of the time the laborer class are taking this chance. Besides this marginal farmers who have strength become interested to cultivate the crops by taking lease or mortgage.

6.4 Pattern of Cultivation 20-50 Years Ago

Agricultural production was different 20-50 years ago which are rarely produced at present.

Table No. 26

Analysis of data about the pattern of cultivation 20-50 years ago

Types of Crops	Production per Acre (Mand)	Expenditure per Acre (Tk.)	Production Value per Acre (Tk.)	Net Profit per Acre (Tk.)
Amon	21-24	1200-1500	4200-4800	3000-3300
Aush	21-24	1300-1600	4300-5000	3000-3400
Wheat	30-40	1500-2000	6000-8000	4500-6000
Barley	15-20	1200-1500	3800-4500	2600-3000
Mustard	12-15	1000-1500	4800-6000	3800-4500
Sesame	9-10	700-1000	3600-4000	2900-3000
Jute	35-40	1200-1500	7000-8000	5800-6500
Kaon	9-12	500-700	2000-2800	1500-2100

From the above table, amon, aush, wheat, barley, mustard, sesame, jute and kaon were produce of which jute was more profitable. Those who cultivate two crops in a single year, they mostly prefer amon or aush and wheat or barley or mustard. Some one produced kaon that was eaten by using various ways like mixed with rice, fried kaon. Berley was rarely produced in the study area. These were the crops that help

to the respondents for better livelihood and fulfilling the demand of their households as well.

6.5 Cultivation at Present

At present high yielding varieties and modern varieties of boro are produced in the study area. Besides this, maize, wheat and jute are produce in the study area. Those who produce boro rice they can only produce that. Those who produce maize they can produce either amon rice or jute by taking with maize. Those who produce wheat they can produce either amon rice or jute by taking with wheat.

Table No. 27

Analysis of data about the cultivation at present

Present Cultivation		**Production per Acre (Mound)**	**Expenditure per Acre (Tk.)**	**Production Value per Acre (Tk.)**	**Net Benefit per Acre (Tk.)**
Types of Crops	Species				
Boro	Irri-29	75-90	21000-22000	49000-60000	28000-38000
	Irri-39	60-66	21000-22000	33000-36300	12000-14000
	Hira	60-75	21000-22000	36000-45000	15000-23000
	Teg	80-90	22000-23000	56000-63000	35000-39000
	Irri-28	75-80	21000-24000	52500-56000	31500-32000
	Zira	54-60	21000-22000	48600-54000	27600-32000
	Minicate	54-60	21000-22000	48600-54000	27600-32000
Maize		120-150	16237-16337	78000-97500	61763-81133
Wheat		35-45	9147-9432	31500-40500	22353-31068
Jute		30-36	5530-5720	30000-54000	24470-48280
Amon		21-24	4800-5040	13650-15600	8850-10560

Now HYV boro is produced more that helps to agricultural change. Not only single species of boro is produced by the respondents those who have more than one acre arable land. Irri-29, Minicate are produced more due to more production per acre and sale vale per mound. Teg production is increasing day by day due to more

production and profit. High yielding varieties (HYV)[2] and modern varieties (MV) are producing in the study area. Respondents are becoming experience and skill on producing such varieties in spite of traditional species of agricultural production. Though few years ago about 15 years, traditional agriculture was produced more that was less profitable in their production. So, cultivated species of rice has been changed and not a single man is found at present who cultivate traditional species of boro as well as agricultural production. As a result the profit of the respondents from the agricultural production is increasing day by day.[3] The expenditure and net profit of the respondents depend on their production skill and sale time of the production because, in the boro season like harvesting period the production value per mound is low but few months latter they can earn more profit by selling their crops like boro production. Cost of production materials differ from year to year so that cost and benefit calculation is made on the basis of a moderate time value of crop production. The price of agricultural production is increased after few months latter from the early period of their production process. Those who produce by taking lease, they become less benefited due to additional expenditure of taka 15000-18000 per acre. But they are also interested to cultivate the land due to getting some opportunities by taking straw and rice from straw. On the other hand their production cost is comparatively lower than others due to self labor is added in their production process.

6.6 Expenditure in Rice (boro) Production

Expenditure of agricultural production depends on the demand and supply of the elements or inputs of the production. Agricultural expenditure especially of rice production is started from the collection of seeds and ended to preservation of production. Besides these, so many activities are occurred in agricultural production. Plant raise is important for safely root out that is mostly completed by the child labor. Cultivation and harrow are practiced in two times after breaking few days. Plant sowing usually practice one time but is checked and re-plant sowing where it necessary.

Table No. 28
Analysis of data about the expenditure in rice (boro) production per acre

Item of Expenditure			Unit (per acre)	Amount Per Unit (Tk.)	Total (Tk)
Rice	Seeds		6 kg	110 per kg	660
	Plant Raise		1 time	600	600
	Cultivation		6 times	200 per cult.	1200
	Harrow		3 times	50 per harrow	150
	Plant Sowing		1 time	1200 per acre	1200
	Fertilizer	Urea	80-90 kg	20 per kg	1600-1800
		TSP	40-45 kg	23 per kg	920-1035
		Potash	25-30 kg	15 per kg	375-450
	Weeding		1 time	pesticides	100
	Diesel		100-120 Liter	68 per kg	7480-8160
	Hire Machine		1 Season	2100 per acre	2100
	Cutting		5 kg per Mound	3600 per acre	3600
	Whooper/Crushing		Lumsum	1200	1200
	Grand Total				21,245-22,255

All respondents use chemical fertilizer in their crop production. Urea, TSP and potash are used in the production that helps more production. Weeding, diesel, hire machine, cutting, crashing by whooper expenditure is also significant for the agricultural production. These tools and elements of agricultural production differ from one to another due to the differentiation of soil fertility and experience of the respondents. The average expenditure of rice production is 21,245 to 22,255 taka per acre. Market value of the expenditure items is more or less up down sometimes. But this expenditure idea helps to understand the real scenario of the crops production.

6.7 Expenditure in Wheat Production

Wheat production is not common in the study area that is mostly produced for the fulfillment of domestic needs. Expenditure of agricultural production depends on the elements of the production.

Table No. 29
Analysis of data about the expenditure in wheat production per acre

Item of Expenditure			Unit (per acre)	Amount Per Unit (Tk.)	Total (Tk.)
Wheat	Seeds		15 kg	25 per kg	375
	Cultivation		6 times	150 per cult.	900
	Harrow		3 times	50 per harrow	150
	Fertilizer	Urea	90 kg	20 per kg	1800
		DAP	45 kg	26 per kg	1170
		Potash	30 kg	15 per kg	450
	Diesel		09 Liter	68 per kg	612
	Hire Machine		1 Season	900 per acre	900
	Cutting		Lumsum	2250 per acre	2250
	Whooper		Lumsum	690-1035 per acre	690-1035
	Grand Total				9,147-9,432

The average expenditure of the wheat production per acre is 9,147-9,432 taka which is completed by purchasing seeds, cultivation, harrowing, using fertilizer, irrigation, cutting and crushing. Irrigation need is very few in the wheat production that helps to reduce the production cost per acre. Fertilizer is used for the increasing of production.

6.8 Expenditure in Maize Production

Few farmers are producing maize due to more production and profit and totally produced for the commercial purpose. Expenditure of Maize production depends on the inputs of the production. The expenditure of maize starts from purchasing seeds. The main expenditure of maize production is plantation and fertilizer cost. Besides these irrigation, cutting, carrying cost and crushing are important for the maize production per acre. Carrying cost is done by the hiring buffalo cart and laborer.

Table No. 30

Analysis of data about the expenditure in maize production per acre

Item of Expenditure			Unit (per acre)	Amount Per Unit (Tk.)	Total (Tk)
Maize	Seeds		9 kg	265 per kg	2385
	Plantation cost		9 person	250 per person	2250
	Fertilizer	Urea	150 kg	20 per kg	3000
		DAP	60-75 kg	26 per kg	1560-1950
		Potash	30 kg	15 per kg	450
	Diesel		24 Liter	68 per kg	1632
	Hire Machine		1 Season	1200 per acre	1200
	Cutting		Lumsum	1500 per acre	1500
	Hire Buffalo cart		Lumsum	2100 per acre	2100
	Whooper		Lumsum	1200 per acre	1200
	Grand Total				16,237-16,367

6.9 Expenditure in Jute Production

Once upon a time jute was produced for the domestic needs and commercial purpose. Now it is produced only for the domestic needs and very few for the commercial purpose. Expenditure of jute production depends on the inputs of the production.

Table No. 31

Analysis of data about the expenditure in jute production per acre

Item of Expenditure		Unit (per acre)	Amount Per Unit (Tk.)	Total (Tk.)
Jute	Seeds	4-5 kg	70 per kg	280-350
	Cultivation	6 times	150 per acre	900
	Fertilizer (Urea)	30-36 kg	20 per kg	600-720
	Cutting	9 labor	250 per person	2250
	Washing	6 labor	250 per person	1500
	Grand Total			5,530-5,720

The expenditure of the jute production per acre is not much more than other crops. Usually it expends by the using inputs like seeds, cultivation, and fertilizer, cutting

and washing. This expenditure becomes much more in the period of water crisis. Heavy rain increases the production cost for using more laborer for washing and drying the jute.

6.10 Expenditure in Rice (amon) Production

About 30 years ago most of the farmer produces amon in the study area. Now it is rare in the study area due to a little number of the farmers interested to produce such crop. Expenditure of amon production depends on the supply of the elements of the production.

Table No. 32
Analysis of data about the expenditure in rice (amon) production per acre

Item of Expenditure		Unit (per acre)	Amount Per Unit (Tk.)	Total (Tk.)
Amon	Seeds	15-20 kg	20 per kg	300-420
	Cultivation	3 times	150 per acre	450
	Fertilizer (Urea)	30-36 kg	20 per kg	600-720
	Cutting	9 labor	250 per person	2250
	Whopper	Lumsum	1200	1200
	Grand Total			4,800-5,040

In the amon production, it is important to production nature for not using of irrigation due to depend on rain. The expenditure depends on the fertility of the respective arable lands. Water crisis make obstacle for production of amon. Climatic change has significant role on amon production. Over flood or crisis of minimum flood also impact on amon production.

6.11 Time of Rice (boro) Production

Time is important for agricultural production due to multiple crops production. Those who produce rice they can only produce rice. Data show that sow seeds and plant sowing are completed within the month of February. Three times use of chemical fertilizer of which 1st round is used during cultivation period, 2nd round is used 15-20 days after sowing and finally is used becoming *thor* means primary stage of creating rice. All such activities are used by hand before and at present.

Table No. 33
Analysis of data about the time of rice (boro) production

Activities		Time	Use of Tools	
			20-50 Years Ago	**At Present**
Sow Seeds		1-15, February	Hand	Hand
Cultivation		10-15 February	Plough, Tractor	Power tiller
Plant Sowing		15-25, February	Hand	Hand
Use Fertilizer	1st	During Cultivation	Hand	Hand
	2nd	15-20 days After sowing		
	3rd	Becomes Thor		
Weeding		15-20 days after sowing	Hand, Pachon, Kachi, Angla, Wider Machine	Pesticides
Pesticides		15-20 days after sowing	Spray machine	Spray machine
Irrigation		From starting to ending	Basket, Doan, Sauti, Power pump	Shallow machine, Electric mortar
Crop Cutting		April-May	Kachi	Kachi
Crop Crushing		April-May	Drum, Scaffold, Rubbing	Whopper Machine, Drum

No weeding is essential in the rice production due to the use of pesticides. 20-50 years ago, this function carried out through hand, *pachon*, *kachi*, *angla* and very few cases wider machine. Crop cutting is started April-May by dint of *kachi.* Crop crushing is completed within the April-May by whooper machine and very few cases drum at present. 20-50 years ago scaffold, rubbing and drum were widely used in the crop crushing. In this production period women play significant role in side the domestic activities carefully.[4]

6.12 Time of Wheat Production

Time is important for agricultural production due to multiple crops production and wheat is produced before the production of amon or jute. This production depends on the dryness of the soil in the study area. Wheat is produced after the rainy season of the *Chalon Beel* area. It starts from the cultivation of soil and completed by crushing the wheat production.

Table No. 34
Analysis of data about the time of wheat production

Activities		Time	Use of Tools	
			20-50 Years Ago	**At Present**
Cultivation		15-31 December	Plough, Tractor	Power tiller
Sow Seeds		1-10 January	Hand	Hand
Use Fertilizer	1st	During Cultivation	Hand	Hand
	2nd	15-20 days After sowing		
Weeding		15-20 days after sowing	Hand, Pachon, Kachi, Angla	Pesticides
Pesticides		15-20 days after sowing	Spray machine	Spray machine
Irrigation		Necessary time during production	Basket, Doan, Sauti, Power pump	Shallow machine, Electric mortar
Crop Cutting		March- April 1st week	Kachi	Kachi
Crop Crushing		March- April 1st week	Drum, Scaffold, Rubbing	Whuper Machine,

A large number of production techniques and tools have been changed in nature in the process of wheat production.

6.13 Time of Maize Production

Time is important for agricultural production due to multiple crops production. Maize is produced before the production of amon and jute. 20-50 years ago maize was not produced due to lack of awareness of the people in the study area. Now it is produced commercially. The maize production starts from the December and end in the month of March-April. This crop is profitable for the farmers in terms of the real price of the production cost and value.

Table No. 35
Analysis of data about the time of maize production

Activities		Time	Use of Tools	
			20-50 Years Ago	At Present
Cultivation		15-31 December	Not produce	Power tiller
Sow Seeds		1-10 January	Not produce	Hand, Stick
Use Fertilizer	1st	During Cultivation	Not produce	Hand
	2nd	15-20 days After sowing		
	3rd	Becomes Thor		
Weeding		15-20 days after sowing	Not produce	Pesticides
Pesticides		15-20 days after sowing	Not produce	Spray machine
Crop Cutting		March- April 1st week	Not produce	Kachi
Crop Crushing		March- April 1st week	Not produce	Whopper Machine

6.14 Time of Jute Production

Time is important for agricultural production due to multiple crops production and jute is produced after the production of wheat or maize.

Table No. 36
Analysis of data about the time of jute production

Activities		Time	Use of Tools	
			20-50 Years Ago	At Present
Cultivation		10-15 April	Plough, Tractor	Power tiller
Sow Seeds		10-15 April	Hand	Hand
Use Fertilizer	1st	During Cultivation	Hand	Hand
	2nd	10-15 days After sowing		
Weeding		10-15 days after sowing	Hand, Pachon, Kachi, Angla	Pesticides
Cutting		15-20 July	Kachi	Kachi
Washing		15-20 July	Hand, Wood	Hand, Wood

Jute production starts in the month of May after taking the wheat or maize. After cutting the jute it keep into water to rotten and few days later it is washed and dries in the heated sun then it becomes usable.

6.15 Time of Rice (amon) Production

Time is important for agricultural production due to multiple crops production. Amon is produced after the production of wheat or maize.

Table No. 37

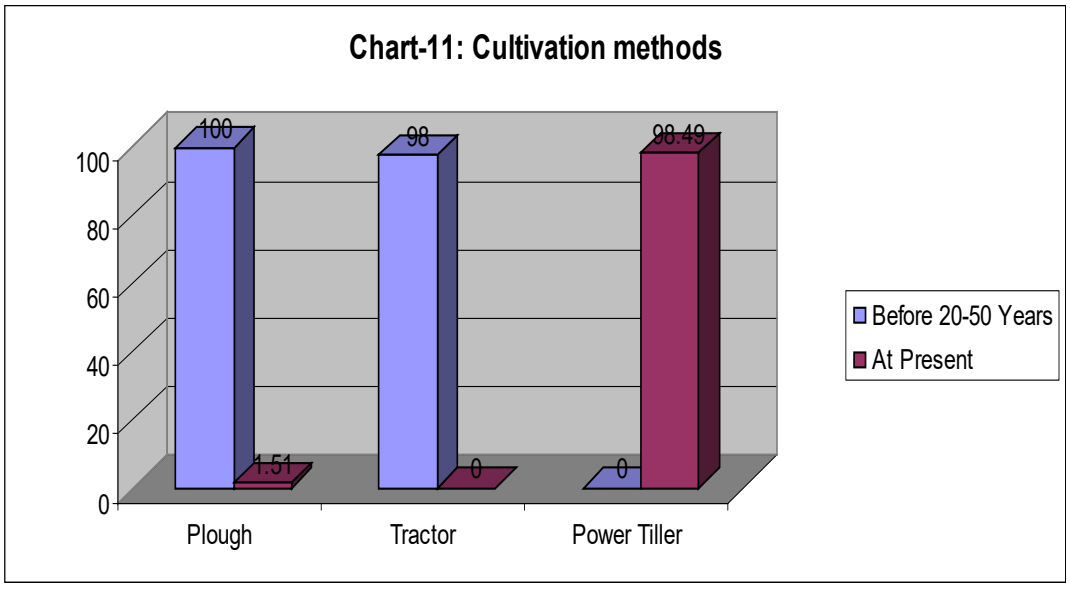
Analysis of data about the time of rice (amon) production

Activities		Time	Use of Tools	
			20-50 Years Ago	At Present
Cultivation		1-10 May	Plough, Tractor	Power tiller
Sow Seeds		1-10 May	Hand	Hand
Use Fertilizer	1st	During Cultivation	Hand	Hand
	2nd	15-20 days After sowing		
Weeding		15-20 days after sowing	Hand, Pachon, Kachi, Angla	Pesticides
Cutting		10-15 November	Kachi	Kachi
Crushing		10-15 November	Drum, Scaffold, Rubbing	Whopper Machine

Amon production starts in the month of May after taking the wheat or maize. Amon production depends on the nature. Any natural calamities like flood of scarcity of water can destroy all the production. On the other hand sufficient water which comes from flood is essential for the amon production.

6.16 Cultivation Method

A remarkable change is found in cultivation methods due to use of modern input and demand of the respondents.



Once upon a time all of the people use plough in the study area. After plough and before invention of power tiller tractor was widely used in the study area. At present very few respondents use plough for their cultivation. Most of the respondents use power tiller. At present plough is time consuming and expensive that is why respondents are not interested to cultivate their land by plough. Now agricultural land is fragmented that create obstacle to move the tractor, besides it is expensive in purchasing. Power tiller is comparatively chipper and faster to cultivate the land that is why it is used widely in the study area.

6.17 Use of Agricultural Tools

There are many agricultural tools used in the production period that sometimes comes from hand made and through purchasing.

Table No. 38
Analysis of data about the use of agricultural tools

Agricultural Tools	**Agricultural Tools**	**Agricultural Tools**
Seeds 265 (100.00)	Power Tiller 261 (98.49)	Bosta 265 (100.00)
Fertilizer 265 (100.00)	Diesel 220 (83.02)	Jhaka 265 (100.00)
Pesticides 265 (100.00)	Pipe 265 (100.00)	Jhata 265 (100.00)
Shallow Machine 220 (83.02)	Harrow 265 (100.00)	Balti 265 (100.00)
Tube Well 220 (83.02)	Kachi 265 (100.00)	Whuper Machine 258 (97.36)
Mortar 45 (16.98)	Kodal 265 (100.00)	Laborer 265 (100.00)
Electricity 45 (16.98)	Roshi 265 (100.00)	Spray Machine 260 (98.11)

Table shows, seeds, fertilizer, pesticide, shallow machine, tube well, mortar and electricity are necessary for agricultural production. Tube well is used for running shallow machine. Shallow machine is operated by diesel. Pipe is used in all irrigation purposes. Power tiller is used in cultivation. Harrow, *kachi, kodal* are used in preparing the agricultural land and cutting the crops. *Roshi* is used in

collecting crops from the land. *Bosta* is used in preserve the crops. *Jhaka*, *jhata* are used in collecting and clearing the yard. Laborer is essential for the agricultural production from the seed bed preparation to preservation of the crops. Spray machine is used in using pesticide. Whooper machine is used for crushing the crops. These tools are used in different stage of agricultural production procee where it is necessary. There are some problems in taking or collecting agricultural tools like high price, artificial crisis in the market and financial crisis of some respondents. About 95.00 percent respondents say that agricultural tools have been improved which is the symbol of prospects of agricultural production and agricultural development as well in the study area.

6.18 Getting Crops in a Year

Rice is grown more that differs from respondents to respondents in terms of their agricultural land, and other crops like wheat and maize also produce in the study area. Table shows that 07.55 percent respondents have no getting rice in a year due to not cultivating the rice production. Some are not interested to produce themselves due to no workable hand. So, they give lease to others who are interested to cultivate by taking lease system. Most of the respondents get 150-200 mound rice in a year. Those who have more land they can get chance to getting more amount of rice. The average rice getting by the respondents is 199 mounds in a year. Most of the time rice is preserved by *golaghor, talaimora, chatal*, and in the *bosta* after drying the rice. 16.23 percent respondents cultivate wheat for their domestic needs mostly and 27.55 percent respondents produce maize for commercial purposes.

Table No. 39

Analysis of data about getting crops in a year

Crops Production	Amount per acre (mound)	Frequency (F)	Percentage (%)	X Mid Value	FX
Rice (boro)	0	20	07.55	0	00
	>50	07	02.64	25	175
	50-100	25	9.43	75	1875
	100-150	25	9.43	125	3125
	150-200	64	24.15	175	11200
	200-250	15	5.66	225	3375
	250-300	47	17.74	275	12925
	300+	62	23.40	325	20150
	Total	**265**	**100.00**		**52825**
Wheat	0	222	83.77	0	0
	>10	11	04.15	05	55
	10-20	15	05.66	15	225
	20-30	12	04.53	25	300
	30-40	04	01.51	32	140
	40+	01	00.38	45	45
	Total	**265**	**100.00**		**765**
Maize	0	192	72.45	0	0
	>50	30	11.33	25	750
	50-100	13	4.91	75	975
	100-150	19	7.17	125	2375
	150-200	07	2.64	175	1225
	200-250	02	00.75	225	450
	250+	02	00.75	175	550
	Total	**265**	**100.00**		**6325**

6.19 Multiple Crops Production

Few years ago it was impossible for multiple crops production due to lack of opportunities and awareness in the study area. At present wheat, maize, amon and jute is produced in a small and large scale in the study area. 92.45 percent respondents produced rice (boro) and they have very few opportunities to cultivate others crops due to time consuming and flood in the study area. Many respondents about 81.51 percent produced others crops with and or boro rice production. These are of course great opportunities for the respondents for their more production and profit. 16.23 percent respondents produced wheat of which 69.77 percent cultivate

amon rice and 30.23 percent cultivate jute after taking their wheat. On the other hand, 23.87 percent respondents produced maize of which 20.55 percent cultivate amon rice and 54.79 percent cultivate jute after taking their maize. These scenarios were absent 20-50 years ago in the study area. These help to the rural people for their financial solvency and effect on their socio-economic status.

Table No. 40

Analysis of data about the multiple crops production

Main Crops	**Additional Crops**	**Getting in a Year**				
		Amount per acre (mound)	**F**	**%**	**X**	**FX**
Wheat	Amon	>10	05	16.67	05	25
		10-20	18	60.00	15	270
		20-30	02	06.67	25	50
		30-40	02	13.33	35	140
		40+	01	03.33	45	45
		Total	**30**	**100.00**		**530**
	Jute	>05	04	30.77	2.5	10
		05-10	02	15.38	7.5	15
		10-15	04	30.77	12.5	50
		15-20	02	15.38	17.5	35
		20+	01	07.70	22.5	22.5
		Total	**13**	**100.00**		**132.5**
Maize	Amon	>10	02	13.33	05	10
		10-20	04	26.67	15	60
		20-30	02	13.34	25	50
		30-40	04	26.67	35	140
		40-50	02	13.33	45	90
		50+	01	06.67	55	55
		Total	**15**	**100.00**		**405**
	Jute	>05	17	42.50	2.5	42.5
		05-10	09	22.50	7.5	47.5
		10-15	07	17.50	12.5	87.5
		15-20	02	5.00	17.5	35
		20+	05	12.50	22.5	112.5
		Total	**40**	**100.00**		**345**

6.20 Use of Rice as Food

Rice is the staple food in Bangladesh that is also in the study area. Once upon a time the main aim of the respondents was production for their domestic needs that is changing due to more profit which encourage production for market and profit as well. But still they are interested to fulfill their domestic demand of rice from their own production. This is also the symbol of social status in the rural areas.

Table No. 41

Analysis of data about the use of rice as food

Amount of Rice (mound)	Frequency (F)	Percentage (%)	X Mid Value	FX
>20	18	06.79	10	180
20-30	51	19.25	25	1275
30-40	114	43.02	35	3990
40-50	47	17.74	45	2115
50-60	22	08.30	55	1210
60-70	07	02.64	65	455
70+	06	02.26	75	450
Total	265	100.00		9675

Domestic needs of rice as food depend on the number of the household's members. The households who have large number of members, they need more rice in a year. Most of the family is nuclear that need less food demand. Table shows that 43.02 percent household's need 30-40 mound rice in a year. The average food demand of the respondents is 36 mounds per year. Most of the respondents prepare their yearly total rice in the season of crop cutting and crushing.

6.21 Irrigation System

Irrigation is very important for the agricultural production especially for high yielding varieties.

Table No. 42

Analysis of data about the irrigation system

Irrigation System	Before 20-50 Years Ago	At Present
Open Water + Doan	119 (44.91)	---
River Water + Shewti	136 (51.32)	---
River + Power Pump	148 (55.85)	---
Open Water + Shallow Machine	186 (70.19)	---
River + Shallow Machine	172 (64.91)	27 (10.19)
Deep Tube well + Shallow Machine	---	193 (72.84)
Deep Tube well + Electric Mortar	---	45 (16.98)

There is a change found in the irrigation system from 20-50 years ago to at present. At first irrigation system was *Doan* that used in open water which was time consuming. Some one used *Shewti* in river or open water that was also time consuming. Beginning of the 80 decades power pump was introduced in irrigation that supplies water from the river. It was a revolution in the irrigation system that cover large amount of land in the study area. Beginning in the late 80 decades shallow machine is introduced that was cheaper than power pump which supply water from the open water and river as well. Those who are financially capable bought such machine. Besides the government supply this shallow machine through bank by loan system to the rural farmers. At present shallow machine and deep tube well is popular to the study area. Those who have opportunity to supply water from the river they collect water from the river by shallow machine. Now some one uses electric mortar with deep tube well to supply the water. 47.92 percent respondents have own ownership in the irrigation system and 52.08 percent have no ownership in irrigation system who hire from others by money per acre. This hiring system is not a problem in the study due to well known to each other that help to enhance social relationships among the respondents. The revolutionary change in irrigation

system creates more production opportunities that imply the socio-economic development of the respondents.

6.22 Problems of Irrigation System

There are some problems that create obstacle in irrigation system due to various issues in the rural areas.

Table No. 43

Analysis of data about the problems of irrigation system

Problems	Frequency (F)	Percentage (%)
Decline Ground Water Level	260	98.11
Dry River	227	85.66
Electricity Crisis	45	16.98
Bore Damage	173	65.28
Machine Damage	232	87.55
Increase Diesel Price	245	92.45
Draught	261	98.49

Decline ground water level is a crucial problem of irrigation system in the study area especially in the month of March to mid May and increasing year after year. As a result it is too hard to supply water during the time. Most of the time the river dries that make obstacle in collecting water. Those who use electric mortar face electricity crisis that impact on irrigation. During decline the ground water level bore of deep tube well become damage that is correct after re-boring the deep tube well. Decline ground water level creates pressure on shallow machine that help to damage the machine. Increasing diesel price create problem in using machine properly. Some one that is very few that have no ownership in the irrigation system. Mixing water into diesel that is also a cause of machine damage. Draught creates pressure on shallow machine by declining ground water level.

6.23 Prospect of Irrigation System

Despite some problems in irrigation system, prospects are creating in the study area that helps to improve the irrigation system and production more as well.

Table No. 44

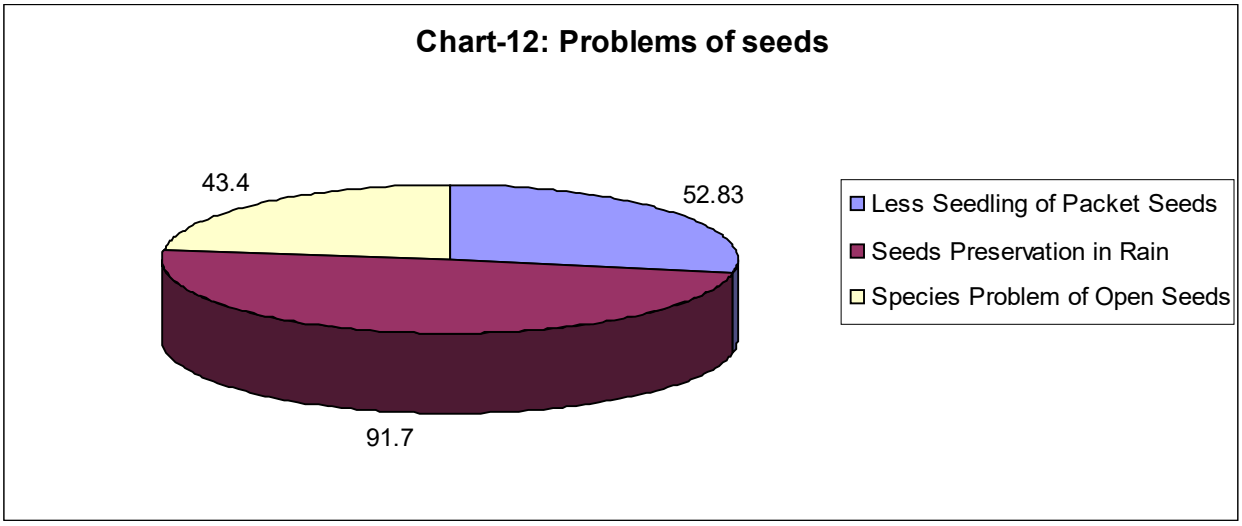
Analysis of data about the prospects of irrigation system

Prospects	Frequency (F)	Percentage (%)
Rubber Drum Bridge	190	71.70
Electrical Mortar Connection	174	65.66
Availability of Parts	226	85.28
Availability of Mechanic	229	86.42
River Dazing	239	90.19

Rubber Drum Bridge is a great opportunity to preserve water in the river during summer season that is helpful to the respondents who have opportunity to collect water from the river. Electric mortar connection is increasing each year that decrease agricultural production cost. Once upon a time scarcity of parts of shallow machine was a problem that is not found at present. Availability of shallow mechanic helps to immediate solves the shallow machine damage. There are two rivers in the study area that can supply free or open water. But river dazing is essential to smoothly running water. By river dazing a large number of lands can easily get chance for irrigation that helps to diversification of crops.[5] Using of surface water will reduce the pressure on ground water.

6.24 Problems of Seed

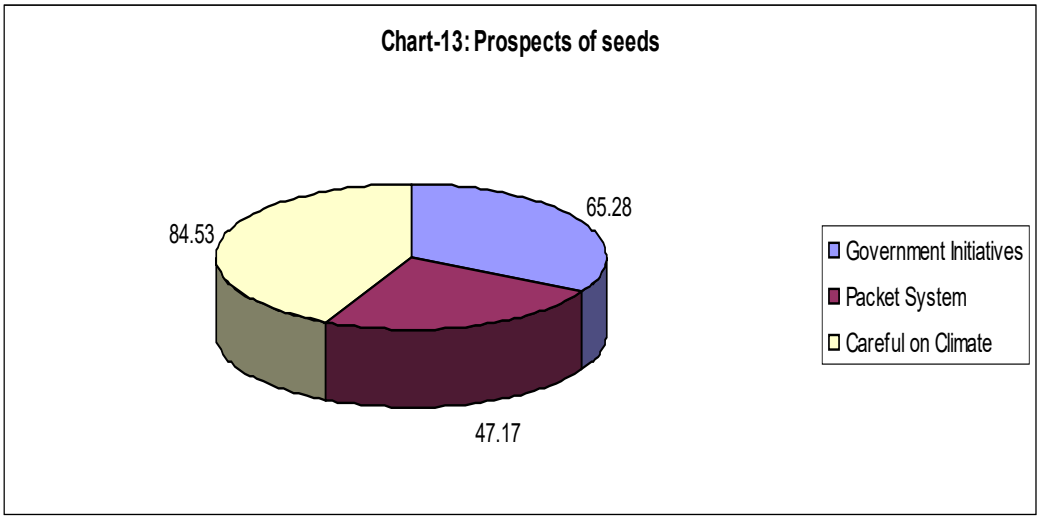
Seed is very important input for agricultural production so that any problems of seed impact on the amount and cost of production.



Data show that, less seedling of packet seeds are a problem that increases production cost and unavailability of plants.[6] In the rainy season or time seeds preservation is too hard for the next year. Open seed that is without packet creates problem to identify the species of the respective crops. As a result sometimes respondents are cheated for buying open seeds.

6.25 Prospects of Seed

Despite the problems of seeds, there are some prospects of seeds in crop production.



Government initiative for the betterment of farmers help to supply agricultural inputs like high yielding varieties and modern varieties seeds.[7] In spite of the

problems of the packet seeds most of the respondents say it help to reduce plants. Once upon a time 60-75 kg seed was necessary per acre for production. Now it is necessary only 06 kg per acre. Yet the production rate is higher in the packet seeds than the open market's seeds. Good weather is helpful to preserve quality seeds. It depends on the awareness and carefulness of the respondents that ensure more production per acre.[8]

6.26 Use of Fertilizer

Chemical fertilizer is used in the agricultural activities that's demand per acre depends on the fertility of land and land size.[9] In the study area urea is more used in the agricultural production in both rice and other crops. Urea, TSP and Potash are used in the rice production where urea, DAP and potash are used in the wheat production. Chemical fertilizer is used more at present than the 20-50 years ago due to decreasing soil fertility and lack of awareness of the respondents. The using ratio of Urea, TSP and Potash is almost 3:2:1. The use of chemical fertilizer is increasing day by day with decreasing soil fertility that is increasing cost of agricultural production. Nobody use organic fertilizer due unavailability of organic fertilizer and think less important than chemical fertilizer for agricultural production purposes.

6.27 Problems of Using Chemical Fertilizer

Respondents face some problems in using chemical fertilizer in the study area that are almost common in the rural areas of Bangladesh.

Table No. 45
Analysis of data about the problems of using chemical fertilizer

Problems	Frequency (F)	Percentage (%)
Low Production for Over Use	163	61.51
Decreasing Soil Fertility	247	93.21
Increasing Demand Each Year	212	80.00
Qualities are Decreasing	190	71.70
Wants of Getting Timely	110	41.51
Lack of Training	233	87.92

Table shows that production is decreasing for over using of chemical fertilizer. Some one tries to more production by using over use of chemical fertilizer. As a result soil fertility is decreasing day by day that also effect on low production per ace. The demand of chemical fertilizer is increasing each year but qualities are decreasing that effect on agricultural production.[10] In some cases wants are found in taking timely due to financial crisis of the respondents. Lack of training is another problem in using chemical fertilizer that creates problem in agricultural production and, health in the study area. Proper training can ensure the perfect use of chemical fertilizer in crops production

6.28 Prospects of Using Chemical Fertilizer

Though there are some problems are found in using chemical fertilizer but few prospects are also found in the study area that helps to produce more.

Table No. 46

Analysis of data about the prospects of using chemical fertilizer

Prospects	Frequency (F)	Percentage (%)
No Crisis	228	86.04
Timely Getting	155	58.49
Preservation is Possible	193	72.83
Multiple Crops	234	88.30

From the above table a very few cases fertilizer crisis are found in the study area. Respondents can get chance to collect their necessary fertilizer timely. The respondents who are able to preserve chemical fertilizer can also get chance to preserve their chemical fertilizer. Multiple crops production is very helpful for agricultural production by using chemical fertilizer in both times.

6.29 Use of Pesticide

Usually pesticide uses for controlling and prevention of insects. Recently it is using in various purposes such as destroy grass, scorpin (*kakara)* and so one.

Table No. 47

Analysis of data about the use of pesticides

Pesticides		**Frequency (F)**	**Percentage (%)**
Name	**Use per acre (gm)**		
Jubash	150	237	89.43
Amakin	150	234	88.30
Amaraj	300	219	82.64
Serium	300	228	86.04
Seor	300	217	81.89

Table shows, there are some pesticides like jubash, amakin, amaraj, serium and seor use in agricultural production. Jubash and amakin are used in killing scorpin (*kakara*). The scorpin (*kakara*) is very harmful for crops that destroy by cutting the root of crops. Amaraj, Serium and seor are used in destroying grass. As a result, it saves laborer cost in the agricultural production. Pesticide was less use in previous time. At present it is widely used in the crops production that is why using rate is increasing day by day. The above company dealers come to the respondents and propagate about their pesticides that help to widely use of pesticides. Most of the respondents say that it is quite impossible to produce crops with out using pesticides. As if pesticides is the part and parcel of agricultural production in the study area.

6.30 Problems of Using Pesticide

Pesticides can increase agricultural productivity, but when handled improperly, it is toxicided to humans and other species.

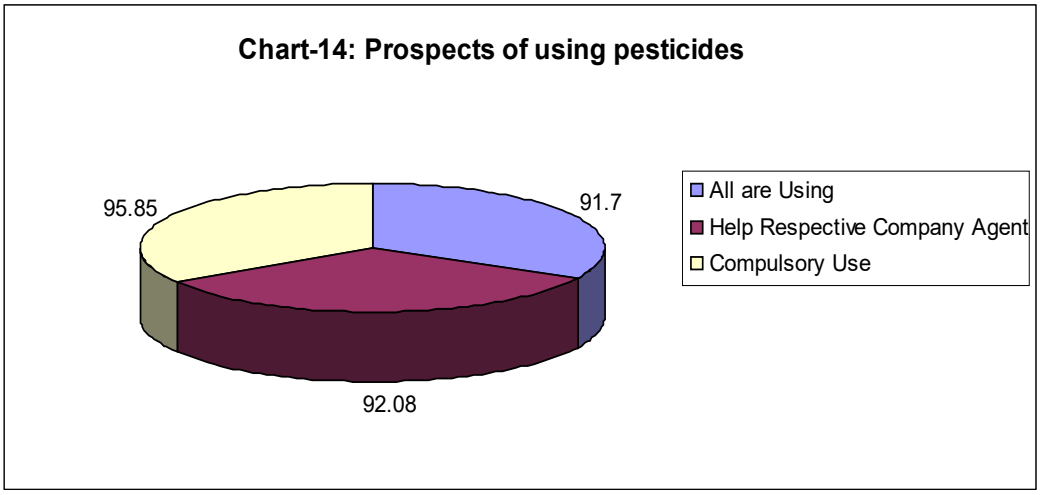
Table No. 48
Analysis of data about the problems of using pesticides

Problems	Frequency (F)	Percentage (%)
Wants Qualities	170	64.15
Ignorance of Using	203	76.60
Vomiting	123	46.42
Feel Dizzy	117	44.15
Over Swatting	40	15.09
Bound to Use Each Year	214	80.75
Decreasing Worth-arm	220	83.02

Many respondents over use pesticides and do not take proper safety precautions because they can not realize the risks and fear of small harvests. Respondent's perceptions of appropriate pesticide use vary with the setting and culture. Some pesticides have wants of qualities that are less active in killing insects and destroying grass. Some one who uses pesticides ignore precautions that create vomiting, dizzy feeling and over swatting.[11] The idea on using pesticides that use one time is bound to use each year. Pesticides have negative impact on worth-arm that directly kills the worth-arm and other useful insects.

6.31 Prospects of Using Pesticide

Pesticides are used in the study area due to the necessity of the farmers. This practice is not new one in our country.[12]



At first pesticides are used in killing various insects latter on it is used in killing of scorpin (*kakara*). Now it is used in killing of scorpin (*kakara*) and destroying grass in the arable land. Some prospects in using pesticides are creating of which all are using that feel encourage to use pesticides; respective company agents are trying to create awareness how to use pesticide as amount and safely to the respondents.[13] Overall most of the respondents give their opinion that they have no alternative way with out using pesticides that is compulsory and increasing their agricultural production.[14]

6.32 Changing Pattern of Crops Production

In the crop production there is a change in the study area that increase production and make profit more.[15]

Table No. 49

Analysis of data about the changing pattern of crops production

Activities	Before 20-50 Years Ago	At Present
Seeds Preservation	At Home	Packet & Open from Market
Seed germination	*Hari*, Pitcher (*Kolosh*)	Sack (*Bosta)*, Straw on Soil
Sow Seeds	Natural Mud	Clay from Dry Land
Plant Sowing	With out Line	With & with out Line
Weeding	Laborer	Pesticides
Irrigation	River, Pond, Ground Water	River, Ground Water
Use of Pesticides	Less Use	More Use
Use of Fertilizer	Less Amount	More Amount
Crop Cutting	Cutting Bottom (*Gora*)	Cutting Top (*Aga*)
Crop Crushing	Drum, *Macha*, Rubbing	Whooper
Preservation	*Chatal, Macha, Bosta*	*Macha, Chatal, Golaghor*

Usually water, seeds, fertilizer and pesticides are the major component in the agricultural production and some activities are done in terms of such factors. 20-50 years ago most of the respondents preserve their seeds at home that were risky in

the rainy season. Now a days it can easily purchase from market as open or packet that is profitable by production for the respondents. Seeds germination was in *Hari* or Pitcher (*Kolosh*) 20-50 yeas ago that was needed more and hard to dandle easily. At present sack (*bosta*) and straw on soil are used in seeds germination that produce more seeds at a time and easy to handle. Sow seeds were onto natural mud, now it is onto clay from dry land. Plant sowing was with out line or accordingly row that was create problem to use wider machine and air running. At present plant sowing is completed with or with out line or according to row that is useful to use wider machine and more production. Laborer was only way to weeding their land. Now very few cases laborer is used rather than pesticides are used in weeding that helps to reduce production cost and minimize wants of laborer. Before 20-50 years ago river, pond and less use of ground water were used in irrigation system that helps to uses surface water more and preserve the ground water. Now a days very few are used river water, most of the respondents used ground water in the study area that creates problem in the summer season and decreasing ground water level. Pesticides were less used but now are more used in amount and compulsory. Chemical fertilizer use was less, now is more and increasing day by day that is increasing production but also decreasing the soil fertility. Before 20-50 years ago crops were cutting into the bottom of the crops that produce more straw which used for cows and cooking. Now crops are cutting top of the crops that reduce straw because of crushing in the whooper machine that crush more amount of crops in a short time. Drum, *macha* and rubbing were used in crops crushing before 20-50 years ago. Now all of the respondents except very small farmers used whooper machine in crushing crops that crush more crops at a time. Preservation of agricultural production is almost same. Agricultural production was preserved in the *chatal, macha* and *bosta* in previous time at present *macha, chatal* and *golaghor* are used in preservation of crops production. It is very clear that vast change came into the agricultural production that is creating more opportunities and some sort of awareness among the respondents which help to make more profit.

6.33 Problems of More Production

The study area is familiar with agricultural production and fishing. Agricultural production is increased after Green Revolution and it is continuing still but some problems are found in more production.

Table No. 50

Analysis of data about the problems of more production

Problems	Frequency (F)	Percentage (%)
Decreasing Soil Fertility	244	92.08
Decreasing Agro-ecology System	216	81.51
Lack of Respondent's Awareness	145	54.72
Lack of Quality Seeds	214	80.75
Lack of Quality Fertilizer	190	71.70
Declining Ground Water Level	245	92.45
Load Shedding	94	35.47
Financial Crisis	110	41.51
Lack of Training	137	51.70

Data show that some problems hindering more agricultural production of decreasing soil fertility is important that is created by over use of chemical fertilizer. Over use of chemical fertilizer causes the decreasing of agro-ecology system that kills useful insects and destroy component. Respondents are producing generation to generation who have no training on crops production. As a result lack of respondent's awareness is found in using chemical fertilizer, pesticides and so one. Quality seeds are a problem for production more. In many cases lack of quality is found in packet seeds in growing plants. Sometimes chemical fertilizer quality is not stand on satisfactory level that is obstacle for production more. Declining ground water level is a serious problem in agricultural production because of increasing production cost, creating pressure on shallow machine and damaging boar system. Load shedding is another problem for the respondents especially who

are depending on electric mortar. Agricultural production rate per acre and price of crops are not same each year that create sometimes financial crisis which make obstacle in purchasing agricultural production materials timely.

6.34 Prospects of More Production

Though some problems in production more but some prospects in agricultural production in the study area that also helps to production more.

Table No. 51

Analysis of data about the prospects of more production

Prospects	Frequency (F)	Percentage (%)
Respondent's Strength	239	90.19
High Yielding Varieties/Modern Varieties	246	92.83
Increasing crops Price	214	80.75
Development of Communication System	198	74.72
Quality Seeds	206	77.74
Educated Persons are involving	145	54.72
Positive Role of Media	175	66.04
Government Initiatives	217	81.89

Data show that respondents strength that encourage more production each year. They produce their production not only domestic food's demand rather fulfills their all demand so that they try to increase agricultural production. Widely practice of high yielding varieties and modern varieties are helping to production more.[16] Increasing crops price helps to production more. Communication system is developing that make opportunity to supply the production materials timely which is also helpful for more production. Different companies and government are trying to ensure quality seeds to increase crops production. Service holders are increasing who are involving in the agricultural production that helps to production more. Both electric and print media are playing important role on awareness building and motivation the respondents how to increase agricultural production. Overall

government agricultural policy for the betterment of respondents and farmers as well to ensure production materials timely are helping for production more.

6.35 Risk and Its Mitigation of Agricultural Production

Respondents face various risks in their production processes and try to mitigate in their own way from generation to generation.

Table No. 52

Analysis of data about the risk and mitigation of agricultural production

Risk	Means of Mitigation	(F & %)
Fog	Avoid this time	177 (66.79)
Storm	Avoid this time	182 (68.68)
Heavy Rain	Outing the water	107 (40.38)
Hailstorm	Early Cutting	127 (47.92)
Draught	River dazing	239 (90.19)
Insects	Innovation modern techniques	262 (98.87)
Decline Ground Water	Reduce deep tube well	190 (71.70)
Not Timely Credit	Escape from money-lender	150 (56.60)

Data shows that respondents face few problems and mitigate those problems, and some risk may be solved by taking initiatives that are needed for mitigation the respective problems. Fog is harmful for seeds bed and plantation that mitigate by avoiding that time which help to solve the problem. Storm is harmful for ripping n crops that may be rice, maize, wheat and so one. It is possible to save the crops from such problems by avoiding and calculating time. Sometime heavy rain that is rare case create problem which is solved by outing water from their arable land. Hailstorm is a threat of the crops that are mitigated by early cutting. Draught may be reduced by dazing the river and *cannel*, and preserve water along with the existing river and *cannel* in the study area. Insects are another risk of agricultural production that is solved by using modern pesticide. Decline ground water is a major risk in summer season in the study that is increasing year after year. This risk

usually solve by making a hole about 10 or 15 feet and set shallow machine but it may be reduced by using surface water more. Financial crisis sometimes makes risk on agricultural production that solve the respondents by taking money from other for few days or taking loan from other which is paid with interest. This problem may be solved by the easier condition of credit for the respondents. This opportunity uses money-lender that is creating financially crisis of the respondents.

6.36 Opinion in the Development of Agriculture

Some respondents have lot of experience in their agricultural production that helps to other's production and for the betterment of our country as well.

Table No. 53

Analysis of data about the opinion in the development of agriculture

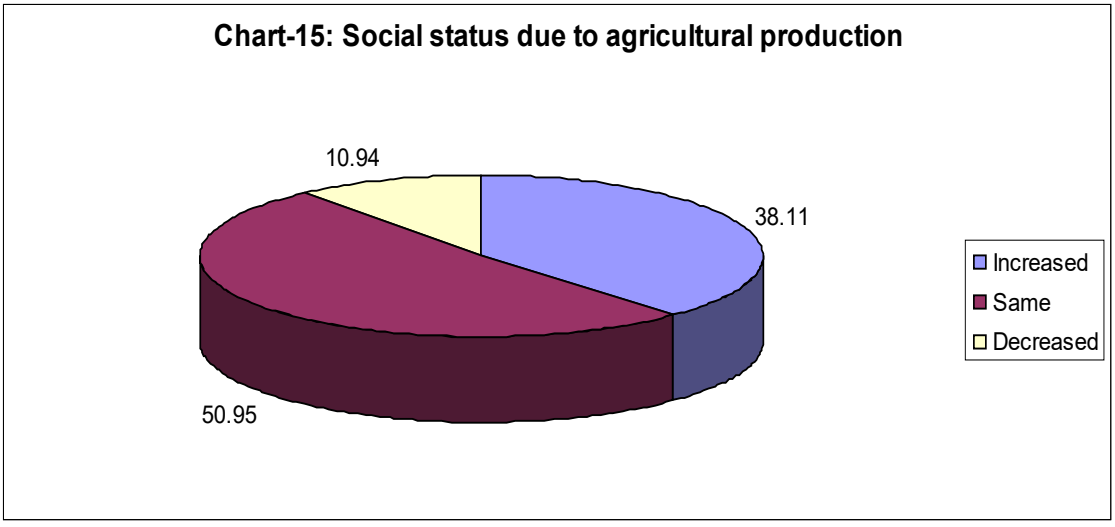
Opinion	Frequency (F)	Percentage (%)
Decrease the price of Agricultural Tools	258	97.36
Increase the Price of Agricultural Production	262	98.87
Real Price during Crop Cutting	240	90.57
Development of the Qualities of Seeds	245	92.45
Development of the Qualities of Fertilizer	248	93.58
Mortar Connection & Electricity Supply	174	65.66
Active Response of Agriculture Officer	145	54.72
Regular Soil Test	177	66.79
Awareness Building of the Farmer	153	57.74
Priority to the Agriculture	229	86.42

From the above table, decrease the price of agricultural tool like diesel, machineries, mortar, electricity bill, seeds, chemical fertilizer, power tiller etc. are essential for the development of agricultural production. Increase the price of agricultural production that will help to production more for the next year. Respondents want to real price of their crops during crop cutting period. Quality

seeds are helpful for production more. So, it is essential to ensure the development of quality seeds. Quality fertilizer can increase production. On the other hand, low quality fertilizer reduces production and increase production cost. Mortar connection and electric supply reduce production cost, so it should be enhance and make more useable to the respondents. Active response of the agricultural officer will help to creating awareness of the respondents and production more that will also expand and develop the agricultural production. Chemical fertilizer is using more and increasing yearly but respondents do not know the real causes for such matter. In this case soil test may help to identify the causes hindering the more use of chemical fertilizer. No respondents test their land's soil in previous year. They are producing their production by dint of their own knowledge. So, awareness building of the farmers is necessary for the development of agriculture. Though agricultural contribution in GDP is decreasing but it's not for low production rather decreasing arable land in each year. So in this context, priority should be taken in agricultural development for food security for the country people and respondents as well. These are the steps which will help for the development of agriculture as well as crops production.

6.37 Social Status Due to Agricultural Production

Social status depends on agriculture in the study area due to directly or indirectly dependency on agricultural production



Most of the respondents say that their status is unchanged due to no special change is found in their life style and social activities. Those who says, their social status has been increased that their income and occupational opportunity especially business has also been created in the study area. Very few respondents say their social status has been decreased due to sell their land and low income than their previous income.

6.38 Summary

Still agriculture is the main source of income in the study area thus agricultural change is to desire of the respondents that is found in the study area. Many respondents are able to purchase arable land that changes the ownership of land. A remarkable change is found in agricultural production from 20-50 years ago. Once upon a time most of the respondents produce traditional crops moreover now all are producing high yielding varieties and modern varieties that helps to production more and profit. Net expenditure has been increased but most of the cases net profit has also been increased. Agricultural production usually starts from the month of December and end on May. It depends on environmental condition. There is a noteworthy change in cultivation method. Many agricultural tools are easily managed and some are managed with troubles. Most of the respondents fulfill their domestic food demand by their production and sale surplus production. Irrigation system has been developed but decline ground water is creating problem in crops production. Packet seeds comparatively better but in some cases creates problems in plant growing. Dependency on chemical fertilizer has been increased that is decreasing soil fertility despite more production. Use of pesticides has been seriously increased that is creating problems on health and environment, though there is no alternative way without using pesticides. Changing pattern of agricultural production is very clear in many cases from preparation of land for production to crop crushing and preservation. There are some problems in more agricultural production but some prospects are also found in agricultural production. Most of the time agricultural production depends on climate that

respondents faces many risks and tries to mitigate such risk by their own ways in the agricultural production. Steps should be taken for the development of agriculture that will help the respondents and country people as well. Most of the respondents have no social status due to any amazing change in their life.

Most of the respondents (36.60%) cultivate their own land. 20-50 years ago amon, aus wheat produced more. At present all the respondents produce HYV and MV boro. The average expenditure of boro production is 21,245.00-22,255.00 taka per acre and net benefit is almost 27,000.00- 32,000.00 taka per acre. The average expenditure of wheat production is 9,147.00-9,432.00 taka per acre and net benefit is 22,353.00-31,068.00 taka per acre. The average expenditure of maize production is 16,237.00-16,367.00 taka per acre and net benefit is 61,763.00-81,133.00 taka per acre. The average expenditure of jute production is 5,530.00-5,720.00 taka per acre and net benefit is 24,470.00-48,280.00 taka per acre. The average expenditure of amon production is 4,800.00-5,040.00 taka per acre and net benefit is 8,850.00-10,560.00 taka per acre. 20-50 years ago 100.00 percent used plough and tractor but at present 01.51 percent use plough and 98.49 percent use power tiller for their agricultural production.

Most of the respondents (24.15%) get 150-200 mounds rice in a year. The average rice getting by the respondents is 199 mounds in a year and the average food demand of the respondents is 36 mounds per year as food. In irrigation system 47.92 percent respondents have their own ownership and 52.08 percent have no ownership who hire from others by money per acre. At present 72.84 percent respondents use deep tube well with shallow machine and 16.98 percent respondents use deep tube well with electric mortar that were absolutely absent 20-50 years ago. They gave their opinion on problems of irrigation system of which decline ground water level is 98.11 percent, dry river is 85.66 percent, electric crisis is 16.98 percent, bore damage is 65.28 percent, machine damage is 87.55 percent, increase diesel price is 92.45 percent and draught 98.49 percent. They also mentioned some prospects of irrigation system of which rubber drum bridge is

71.70 percent, electric mortar connection is 65.66 percent, availability of parts is 85.28 percent, availability of machine is 86.42 percent, and river dazing is 90.19 percent. The respondents gave their opinion regarding the problems of seeds in which less seedling of packet seeds is 52.83 percent, seeds preservation in rain is 91.70 percent and species problem of open seeds is 43.40 percent. There are some prospects of seeds of which government initiatives is 65.28 percent, packet system is 47.17 percent and careful on climate is 84.53 percent. All the respondents use chemical fertilizer in their production process. The using ratio of Urea, TSP and Potash is almost 3:2:1. There are some problems of using chemical fertilizer of which low production for over use is 61.51 percent, decreasing soil fertility is 93.21 percent, increasing demand each year is 80.00 percent, qualities are decreasing is 71.70 percent, wants of getting timely is 41.51 percent and lack of training is 87.92 percent. They also gave their opinion on the prospects of using chemical fertilizer which are no crisis is 86.04 percent, timely getting is 58.49 percent, preservation is possible is 72.83 percent and multiple crops production is 88.30 percent. All the respondents use pesticides. They gave their opinion on problems of using pesticides in which wants of qualities is 64.15 percent, ignorance of using is 76.60 percent, vomiting is 46.42 percent, feel dizzy is 44.15 percent, over swatting is 15.09 percent, bound to use each year is 80.75 percent and decreasing worth-arm is 83.02 percent. They also gave their opinion regarding the prospects of using pesticides of which all are using is 91.70 percent, help respective company agents is 92.08 percent and compulsory use is 95.85 percent.

The respondents gave their opinion on the problems of more production which are decreasing soil fertility is 92.08 percent, decreasing agro-ecology system is 81.51 percent, lack of respondent's awareness is 54.72 percent, lack of quality seeds is 80.75 percent, lack of quality fertilizer is 71.70 percent, declining ground water level is 92.45 percent, load shedding is 35.47 percent, financial crisis is 41.51 percent and lack of training is 51.70 percent. They also mentioned some prospects of more production which are respondent' strength is 90.19 percent, high yielding

varieties are 92.83 percent, increasing crops price is 80.75 percent, development of communication system is 74.72 percent, quality seeds is 77.74 percent, educated persons are involving is 54.72 percent, positive role of media is 66.04 percent and government initiatives is 81.89 percent. They face different types of risk in their production and mitigate that risk in their own ways

They gave their opinion in the development of agriculture through decreasing the price of agricultural tools, increasing the price of agricultural production, development of the qualities of seeds and fertilizer with soil test in the study area. The 38.11 percent respondents said that their social status has been increased due to agricultural production. 50.95 percent respondents said that their social status is till same. 10.94 percent respondents said that their social status has been decreased due to agricultural production and fulfillment of their domestic needs. Agricultural production system like multiple crops production, HYV and modern varieties production has remarkably changed that effect on increasing arable land use, more production, pattern of crops production etc. in the study area. In the changing context of agricultural production respondents faced some problems; on the contrary, they also hopeful for the prospects of agricultural change that encourage them to survive in the rural settings of Bangladesh. .

End Note

[1.]Hossain and Bayes (2010) said, In rural Bangladesh, about 40 percent of the cultivated land is now operated by the tenants, compared to 23 percent in 1988.

[2.]The farmer expanded HYV Boro rice farming in order to compensate for any loss from flood damage in other rice seasons because it grew in a flood risk-averse situation in dry season (Hossain, 2001).

[3.]Sahota (1968) said, The increasing production of food is the consequence of a worldwide process of expansion of arable land and of continuing intensification of agriculture. One of the main components of this process is the increasing use of fertilizers, following substantial reductions in their prices resulting from technological improvements in the chemical industry (cited in Evenson and Kislev, 1975).

[4.] Women are intensively involved in agriculture of Bangladesh. It can be said the women are prominent producer of food in Bangladesh. They are active in every sphere of agriculture from gathering, paddy crashing, drying etc. (Sarwar, 2007).

[5.]Hossain (1988) said, Irrigation has an adverse effect on diversification of crops. Except for rice and oilseeds, all crops are grown less often on irrigated land than on unirrigated.

[6.]Most of the peasants are loosing their seeds due to the use of high breed seeds (Sarwar, 2007).

[7.]Hossain (1988) said, The rice MVs have opened up an opportunity to increase production substantially from a given amount of land.

[8.]Hossain (1988) said, The amount of seed used per unit of land depends on whether the seed is broadcast or a separate seed bed is prepared to grow seedlings that are then transplanted to the main field.

[9.]Small farmers were found relatively more to expend fertilized areas. However, fertilizer use per acreage was higher for large and medium farmers followed by small farmers in HYV Boro rice farming in 1998 in the 'collaborative' policy phase (Abedin, *et al.,* 1999).

[10.]The farmers were cheated in buying low nutrient SSP fertilizer because of almost same color of TSP and SSP(Akanda *et al.,* 1999).

[11.]Use of chemical pesticides has affected on human health (Sarwar, 2007).

[12.] Dasgupta *et al.*, (2006) said that like many developing countries, Bangladesh has promoted the use of pesticides to expand agricultural land and increase output per acre.

[13.]Private business develop and supply a substantial number of the technologies that farmers use or introduce (examples include seed, fertilizer, pesticides and machinery) (The World Bank, 2007).

[14.]Like many developing countries, Bangladesh has promoted the use of pesticides to expand agricultural land and increase output per acre (Dasgupta *et al.,* 2006).

[15.]Cropping pattern has been changed day by day. The big farmers or business companies capture most of the agricultural land. Substance farming system has been changed into specified cropping pattern (Sarwar, 2007).

[16.]Crop production increased over the last quarter century with changes in areas under various crops (Alam, 2000).

CHAPTER – SEVEN

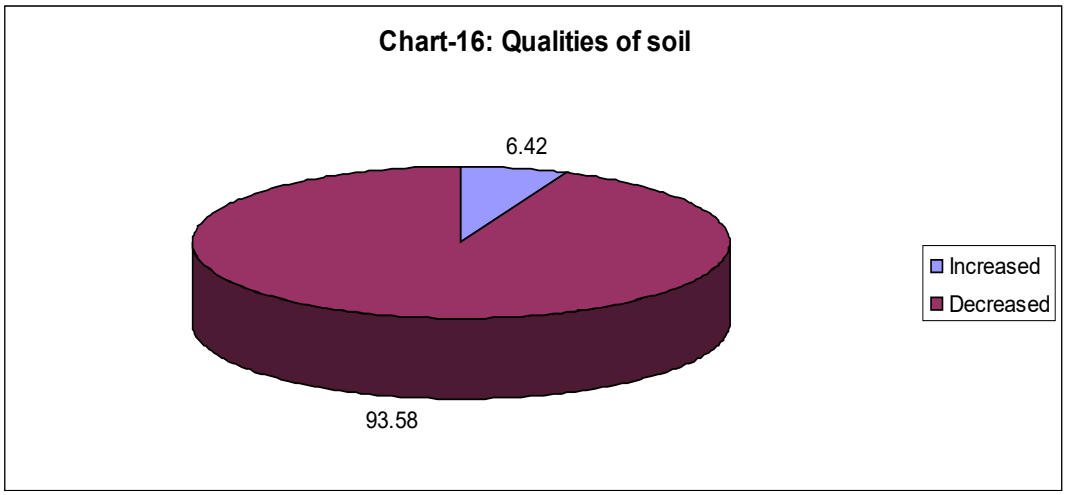
AGRO-ECOLOGICAL SYSTEM

7.1 Introduction

Rapidly decline of soil fertility is a problem of crop production in Bangladesh. The organic matter in croplands has been decreasing. Over uses of fertilizers, unplanned cultivation and improper management of soil have already caused not only stagnation but also decline in productivity of modern varieties (Kashem *et al*., 2007). Inclusion of green manuring crops and their biomass incorporation in the existing farmers' cropping practice may be the effective means to maintain soil fertility as well as crop productivity. Evidences have shown that the status of soil fertility can be improved through inclusion of green manuring crops and their biomass incorporation in the rice-rice cropping pattern (Choudhury *et al*., 2004; Rahman *et al*.,2005; BRRI, 2006). Climate change is expected to have a wide range of direct and indirect impacts on human health, ecological systems, and socio-economic sectors. The ultimate effects of climate change on socio-economic or ecological systems will depend on three broad factors: the characteristics of the change in climate, the sensitivity of the system to a given change, and the capacity of the system to adapt to climate change (O'Neill *et al.,* 2001). Indirect effects of global climate change on rice production will also occur via ecosystem responses (Barnes *et a.l,* 1989; Bazzaz *et a.l*, 1985; Oechel and Allen, 1985).

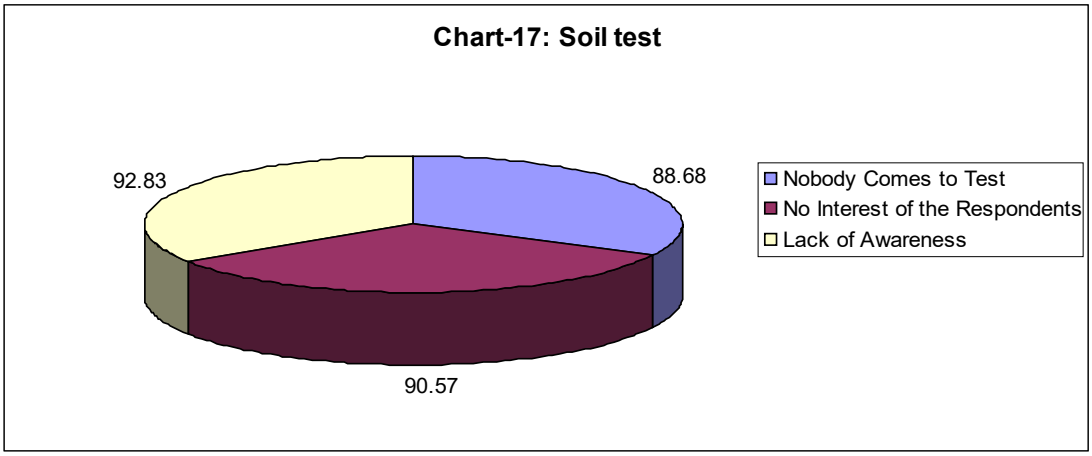
7.2 Qualities of Soil

Quality of soil is an important factor of agricultural production. Soil qualities depend on the use of agricultural tools and techniques. Use of agricultural tools and techniques also depend on the consciousness of the respondents. Most of the respondents states that soil quality has been decreased[1] due to over use of chemical fertilizer, pesticides, decline ground water level and decreasing clay that are decreasing agricultural production per acre and increasing use of chemical fertilizer each year. Those who thinks soil quality has been increased because of cultivation of multiple crops that are helpful to the quality of soil.



7.3 Soil Test

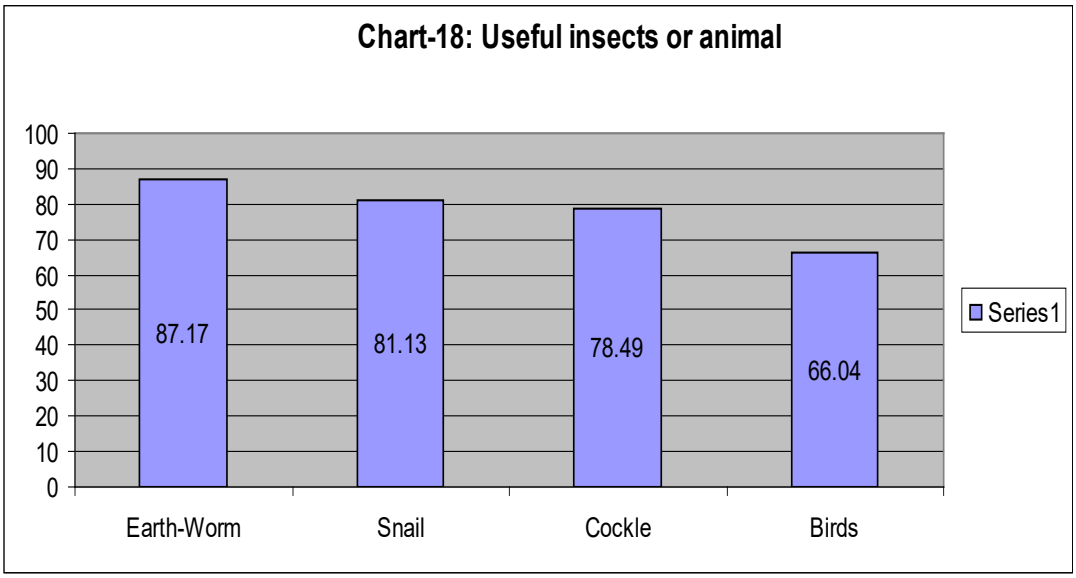
Soil test helps to find out the quality of soil that is also helpful for the crops production.[2] So, soil test is necessary for the development of arable lands.



All of the respondents want to test the quality of soil but limitations are found in some cases. Most of the respondents say that they are not aware on testing soil. Somehow they don't know the result of soil test and they are not interested to test soil yearly or after certain periods. Respondents' opinion is that the authority of soil test should have to their responsibilities for soil test each year. But nobody comes to test soil in the study area. As a result respondents are producing year after year with out soil test of their arable land. But it can help the farmers how to use chemical fertilizer and pesticides in their lands.

7.4 Useful Insect and Animal

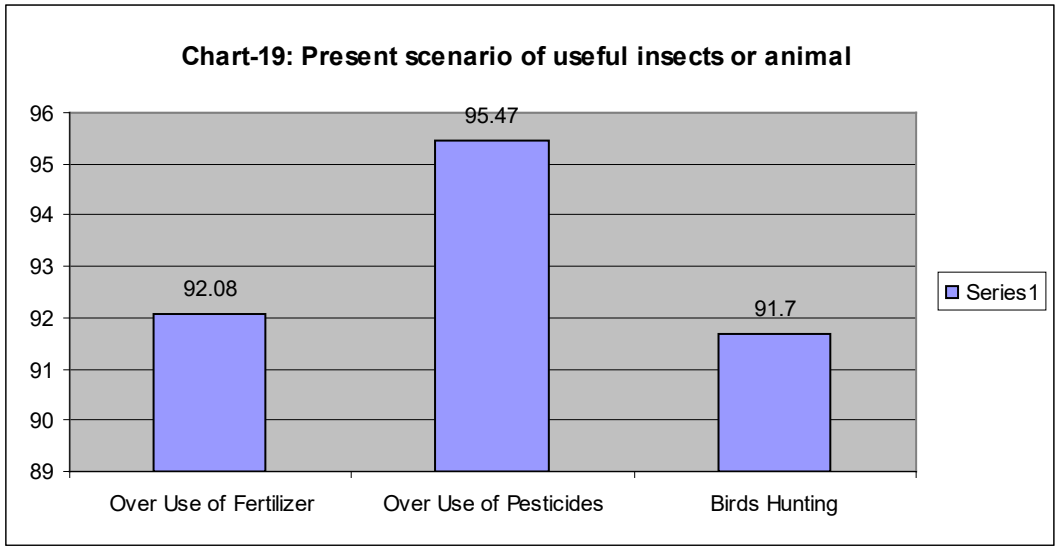
There are some insects and animal that helps to develop agro-ecology in the study area that also helpful for production more per acre.



Earth-worm is called the plough of nature. It contributes on agricultural production by plough of land and stool. Snail improves the soil quality by dint of it rotten and small scale of plough. Cockle plays almost same role as snail. Birds catch and kill many insects whose are harmful to the agricultural production. Besides this some birds eat snail and cockle and their stool in that time is used as organic fertilizer that play role on crops production.

7.5 Present Scenario of Useful Insect and Animal

Once upon a time many more useful insects and animal were found in the study area but now some have been decreased and some are endanger due to some sorts of man made causes. Over use of chemical fertilizer and pesticides are causes of reducing and some how abolishing the earth-worm, snail and cockle in the study area. Birds hunting are another causes for reducing birds that is also reduces for wants of feed for them. As a result opportunities are decreasing to develop the agro-ecology system, but it should be controlled that will play significant role for agricultural production more.



7.6 Causes of Decreasing Birds in Agricultural Field

The birds those are helpful for the agricultural production that is decreasing in many ways and reasons.

Table No. 54

Analysis of data regarding the birds in agricultural field

Causes of Decreasing	Frequency (F)	Percentage (%)
Decreasing Insects	257	96.98
Wants of Foods	244	92.08
Use of Pesticides	253	95.47
Wants of Nest	231	87.17
Hunting	243	91.70

Decreasing insects due to over use of pesticides create wants of food for the birds. Trees are decreasing due to over population and making housing and agricultural land that creates the wants of nest for the birds. Birds are reducing in terms of hunting and lack of feeding in the study area. Most of the respondents say that many useful birds have been decreased that impact on agro-ecology system in the study area.

7.7 Birds in Season

Usually seasonal birds come in the study area during winter season that are decreasing day by day.

Table No. 55
Analysis of data regarding the birds in seasons

Causes of Decreasing	Frequency (F)	Percentage (%)
Decreasing Insects	229	86.42
Decreasing Fish	245	92.45
Decreasing Snail-Cockle	241	90.94
Wants of Nest	231	87.17
Hunting of Birds	137	51.70
Land is dried Quickly	151	56.98

Decreasing insects and fish create wants of foods. Decreasing snail-cockle is another cause in reducing seasonal birds. In rainy season no crops are cultivated in the study area that makes wants of nest of the seasonal birds. 20-50 years ago in rainy season amon was produced more that creates food and nest opportunities for the birds. Hunting birds create problem in abolishing the birds as well as seasonal birds. Sometime land is dried quickly in the study area that is the time before coming of the seasonal birds as well.

7.8 Fertility in Terms of Same Crop Production

Multiple crops production is very important for the fertility of arable land which increases agricultural production that is not well known to all respondents in the study area.

Table No. 56
Analysis of data regarding the fertility in terms of same crop production

Social Fertility	Frequency (F)	Percentage (%)
Fertility is Decreased	237	89.43
Fertility did not Decrease	23	8.68
Unknown to the Respondents	05	1.89
Total	265	100.00

Most of the respondents say same crops production is the causes of decreasing land fertility because of the roots of the crops go under the soil in same areas and live on the basis of same ways that obstacle for more production. Some one gives their opinion that fertility did not decreased because they could not identify the differences. Very few respondents are unknown regarding this matter because they fail to understand the change though they produce only. Most of the respondents say that multiple crops production rather same production is helpful for the more production and soil fertility as well. Yet multiple crops production is being possible since about 5 years ago by producing maize and wheat production in the study area.

7.9 Impact of Irrigation on Agro-Ecology

Irrigation especially over use of ground water creates a tremendous impact on ago-ecology in many ways.

Table No. 57

Analysis of data regarding the impact of irrigation on agro-ecology

Impacts	Frequency (F)	Percentage (%)
Decline Ground Water Level	262	98.87
Increased Dryness of Soil	214	80.75
Decreased Clay	159	60.00
Decreased Soil Fertility	164	61.89
Decreased Preservation Ability	215	81.13

Over use of ground water by deep tube well decline ground water level in each year that creates dryness of the soil and decrease clay in the cultivation period. This is also the results of decreasing soil fertility.[3] Dryness is a major obstacle on water preservation in the arable land. In the starting period of boro season ground water exists fewer than 10/15 feet deep that are increased into 30/35 feet in the month of April-May. 20-50 years ago it was less than 15/20 feet deep during the month of April-May. If ground water becomes less easy to the shallow machine and mortar then the production cost and rates become increased.

7.10 Summary

Agro-ecology system plays significant role in agricultural production in many ways like control of soil fertility; creation of balance among insects, birds and other useful animal; and more production as well. Once upon a time it was a great opportunity of agro-ecology in favor of agricultural production. This scenario is not found at present in the study area because of soil quality has been decreased; useful insects and animal likewise earth-worm, snail, cockle and birds have been decreased due to many reasons. Multiple crops production endowed in the study area that helps to improve the soil fertility and agro-ecology as well. Impact of irrigation on agro-ecology is very negative in the study area for declining ground water level that creates problem in high production and agricultural development in the study area.

6.42 percent respondents said that soil qualities of the arable land have been increased and 93.58 percent respondents said that soil qualities of the arable land have been decreased. They gave their opinion on soil test that nobody comes to soil test is 88.68 percent, no interest of the respondents is 90.57 percent and lack of awareness is 92.83 percent. They mentioned some useful insects and animals that are earth-worm is 87.17 percent, snail is 81.13 percent, cockle is 78.49 percent and a bird is 66.04 percent. They said that at present many useful insects and birds or animals have been decreased due to many reasons like over use of chemical fertilizer (92.08%), over use of pesticides (95.47%), hunting (91.70%), decreasing insects (96.98%), wants of foods (92.08%), wants of nest (87.17%), land is dried quickly (56.98%) and decreasing fish (92.45) in the study area. The respondents gave their opinion on fertility in terms of same crop production of which fertility is decreased is 89.43 percent, fertility did not decrease is 8.68 percent and unknown to the respondents is 1.89 percent. They also gave their opinion on the impact of irrigation on agro-ecology that are decline ground water is 98.87 percent, increased dryness of soil is 80.75 percent, decreased clay is 60.00 percent, decreased soil fertility is 61.89 percent and decreased preservation ability is 81.13 percent.

Agriculture friendly agro-ecological system is more crucial for production more and agricultural change as well, and more production improve the quality of lifestyle of the rural people who are directly or indirectly depend on agriculture.

End Note

[1.] Lal *et al.* (1989) defined soil degradation as 'Diminution of soil quality (and thereby its current and potential productivity) and/or a reduction in its ability to be a multipurpose resource due to both natural and man-induced causes'.

[2.] Soil is the most basic of all resources and the primary substrate for growing crops (Pal *et al.,* 2009).

[3.] Soil degradation is a narrower term for declining soil quality, encompassing the deterioration in physical, chemical, and biological attributes of the soil (Enters, 1998).

CHAPTER – EIGHT

IMPACT OF CLIMATE ON AGRICULTURE

8.1 Introduction

Bangladesh is characterized by excessive rainfall and floods during summer and drought conditions during winter (Mukherji, 1974). Agriculture in Bangladesh is influenced by seasonal characteristics and climatic variables such as temperature, rainfall, humidity, day length etc. Production of crops, particularly rice, is often constrained by different climatic hazards such as floods, droughts, soil and water salinity, cyclones and water surges (Mainuddin *et al.,* 2011). Increased temperatures also causes significant changes in weather patterns with extremes of rainfall and strong winds (Ngaira, 2007).The potential interactive effects of CO2 and temperature on rice are also critical for predicting the effects of global climate change on rice (Acock and Allen, 1985). The global temperature has increased in recent times, as has the atmospheric concentration of CO2, CH4 and other gases. Green house gases cause a warming of the world because these gas molecules absorb outgoing long wave radiation and therefore less radiation is lost to space (Ngaira, 2007). Climate change will create major challenges for agriculture (Lampietti *et al.,* 2009). According to Choudhury (2008), Bangladesh is one of the most disaster-prone areas of the world. The low lying delta region of Bangladesh is subject to severe flooding from monsoon rains, cyclones and tidal waves in the coastal districts particularly in the costal belt with major crop damage and high loss of lives.

8.2 Impact of Climate on Crops Production

There are some impacts of climate on crops production that make less profit and low production per acre.

Table No. 58

Analysis of data about the impact of climate on crops production

Activities	Impact	Frequency (F)	Percentage (%)
Seeds Sowing	Fog, Cold	232	87.55
Plant Raise	Fog, Cold, Rain	230	86.79
Use of Fertilizer	Rain, Draught	162	61.13
Harrowing	Rain, Cold	137	51.70
Crops Cutting	Rain, Hailstorm	239	90.19
Crops Crushing	Rain, Storm	260	98.11

Most of the time impact of climate on crops production is found in many ways during the period of crops production. Fog and cold weather create obstacle in sowing seeds that decrease the normal growth of plants. Fog, cold weather and rain create hindrance plant raise that waste many plants. Rain and draught make obstruction of the proper functions of chemical fertilizer. Rain and cold weather create obstacle on harrowing that is delayed which also impact on production more. Rain and hailstorm sometimes destroyed crops and also make problem on crops cutting. Rain and storm make obstacle on crops crushing that delayed in crops crushing and sometimes losses crops. Though there are some obstacles on crops production that make loss of the agricultural production yet, climate has positive impact on agricultural production. If rain is fallen in accurate time, that is very helpful for the agricultural production by dint of saving expenditure and production more. But still fog, cold weather, draught, storm and hailstorm are very harmful for the agricultural production in the study area.

8.3 Negative Impact of Climate on Crops Production

There are some specific negative impacts of climate on crops production in different ways.[1]

Table No. 59

Analysis of data about the negative impact of climate on crops production

Impact	Frequency (F)	Percentage (%)
Low Production	236	89.06
Re-plant Raise	213	80.38
A Grain of Paddy Containing no Rice	203	86.79
Marketing Problems	176	66.42
Preservation Problems	234	88.30

Low production per acre is the results of negative impact of climate. Raising re-plantation is needed due to cold weather, fog and heavy rainfall. Draught makes no rice in a grain of paddy containing, is also created for increasing pests that grow for favorable weather. Rain, storm impact on crops marketing that create obstacle for buying and selling agricultural production. Rice preservation is very necessary for getting more prices in the next time that is affected by rain, storm, heavy cold weather or fog and storm or hailstorm.

8.4 Impact of Climate on the Expenditure of Crops Production

Expenditure of crops production almost depend on favorable climate because, it may be increased for draught, storm, hailstorm etc.

Table No. 60

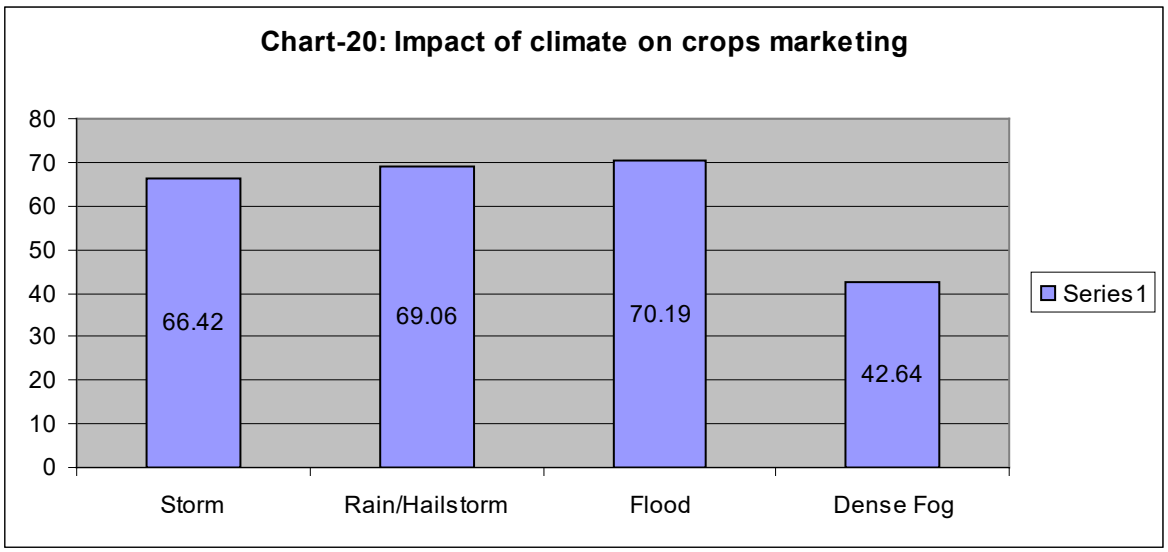
Analysis of data regarding the impact of climate on the expenditure of crops production

Causes	Frequency (F)	Percentage (%)
Use of More Plant	242	91.32
Use of More Labor	245	92.45
Extra Hard Work	239	90.19
Over Use of Fertilizer	234	88.30
Use more Diesel	228	86.04
Decline Ground Water Level	245	92.45
Early Cutting	118	44.53

Fog, cold weather destroys agricultural plants that require more plant which increase agricultural production expenditure. Labor is used more in case of heavy rain, storm etc. for preparation and maintenance of agricultural production. Respondents themselves and their household's members work hard in any unfavorable and terrible climatic condition. Over use of fertilizer and diesel has been increased for draught. In summer and dry season, ground water level decline that create pressure on diesel, shallow machine and mortar. Early cutting is made for the fear of storm and hailstorm that loss the respondents by low production rate and impact on expenditure of the agricultural production.

8.5 Impact of Climate on Crops Marketing

Agricultural production is not produce not only for the domestic consumption but also for the market which helps to the development of the respondents and country's food security as well.



The study area is stands on the *Chalon Beel* area whose communication for marketing is not good enough. Storm creates problem in the rainy season due to boat is only way for communication and also summer season that's nature is different from rainy season. Rain and hailstorm make obstacle in summer season because of clay and muddy of the road. Flood creates problems in the rainy season for communication with boat. Dense fog is the problem for communication in the

winter season. If respondents can get chance to go to the market for selling their agricultural production, that help to profit more otherwise carrying cost is increased and create obstacle for food supply of the country people as well.

8.6 Impact of Climate on Food Habits

Rice is the staple food of the respondents. Yet, change in food taking is found 20-50 years ago and at present due to the changes of agricultural production.

Table No. 61

Analysis of data regarding the impact of climate on food habits

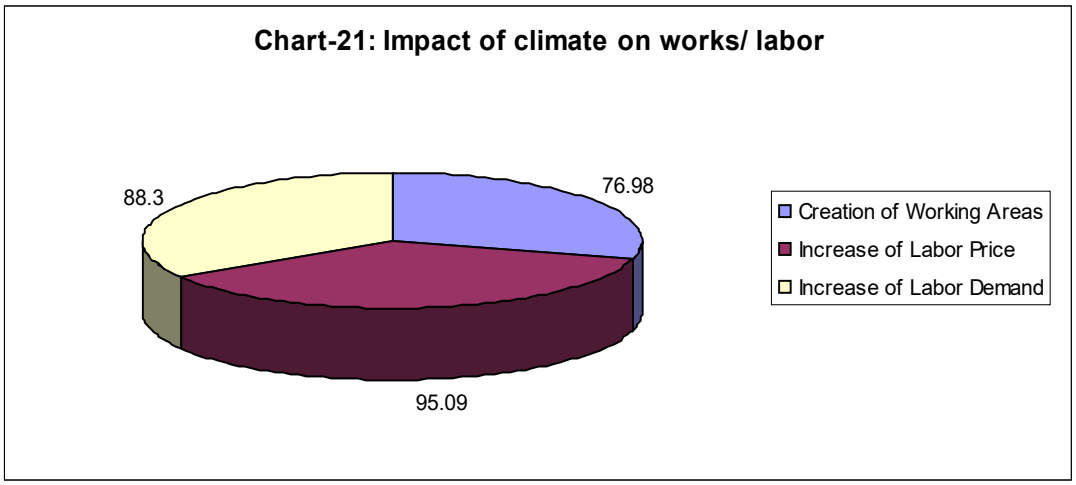
Foods	Before 20-50 years Ago	At Present
Wheat	172 (64.91)	13 (4.91)
Barley	106 (40.00)	---
Kaon	53 (20.00)	---
Maize	27 (10.19)	148 (55.85)
Mustard	264 (99.62)	89 (33.58)
Shaluk	53 (20.00)	---
Boro (Local)	198 (77.72)	---
Boro (HYV)	--	265 (100.00)
Aush	225 (85.00)	03 (01.13)
Amon	217 (81.89)	10 (03.77)

20-50 years ago wheat produced more and most of the people ate wheat, now it is used very less due to very little production of wheat. Those who eat wheat at present, they purchase that wheat from market and other convenient places. Barley produced and some one ate that, now it is not produced in the study area. Someone produced kaon and taken as food. Now nobody produce kaon in the study area. Maize is taking in many ways like fried, beaten, burn etc. at present and it is popular to the children. Mustard used more in cooking and other uses. At present some one uses mustard as oil for cocking. Shaluk means lotus that is esculent root of different kinds of lotus that was eaten by the poor people. Now nobody eats shaluk as food due to poverty are not stands on the level of previous time and also unavailability in the study area. Most of the respondents produced local boro before

20-50 years ago that was the main food for the respondents which is not produced at present. At present all are producing High Yielding Varieties (HYV) and Modern Varieties (MV) that is taking as food. Very few produced amon at present and sometimes few are taking as food by purchasing amon. Before 30 years ago aush and amon produced more and taken as food more. These agricultural change and food habits depend on climate which helps to make demand in what crops are necessary for production.

8.7 Impact of Climate on Work/Labor

Agricultural production depends on climate and more production creates working opportunities that are helpful to the laborer.



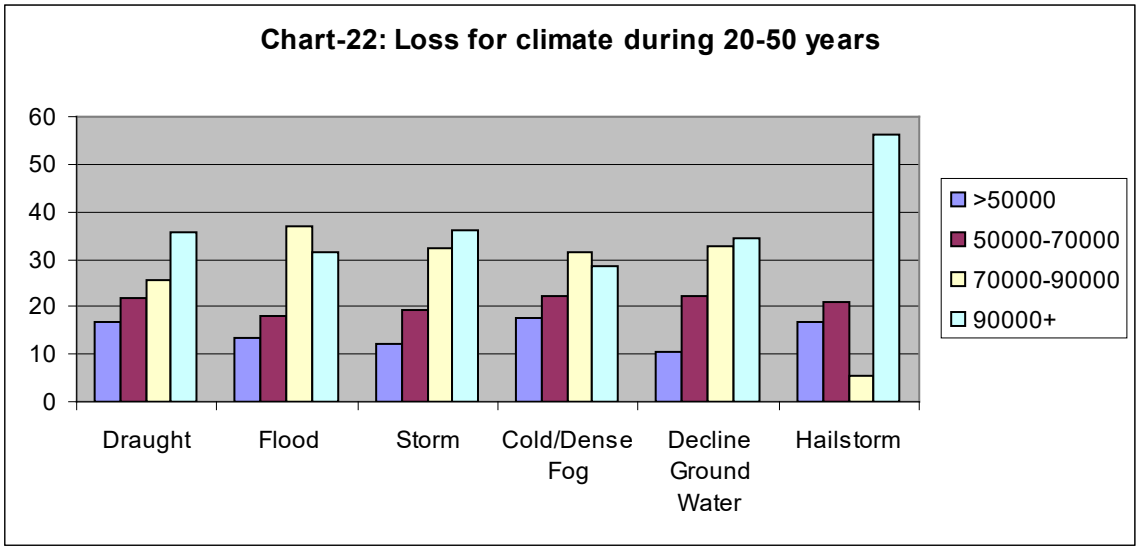
Working areas are creating from 4/5 years ago because of multiple crops production. Before 4/5 years to 30 years only single crop likewise local boro produced in the study are. So, multiple crops production creates working opportunities for the laborer. Laborer demand and price have been increased that is helpful to the laborer's livelihood. This is possible due to more production and multiple crops production. Laborers are benefited that creates opportunities for their children's education, occupation and so one in the study area.

8.8 Loss for Climate during 20-50 Years

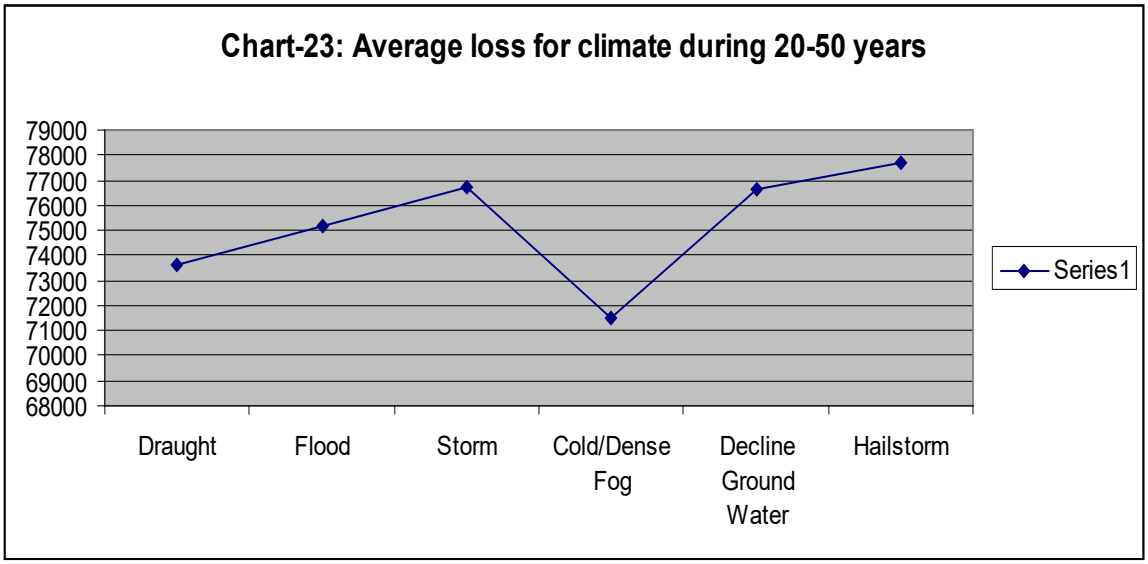
It is very difficult to say how much money is lost for climate issues during 20-50 years because of not a single climate issue are involved in such impacts. Yet, most of the respondents calculate on an average loss in their production time.

Table No. 62
Analysis of data regarding the loss for climate during 20-50 years

Impacts		Frequency (F)	Percentage (%)	X	FX
Activities	**Amount (Thousand Tk.)**				
Draught	> 50	44	16.60	25000	1100000
	50-70	58	21.87	60000	3480000
	70-90	68	25.66	80000	5440000
	90+	95	35.85	100000	9500000
Flood	> 50	36	13.58	25000	900000
	50-70	48	18.11	60000	2880000
	70-90	98	36.98	80000	7840000
	90+	83	31.32	100000	8300000
Storm	> 50	32	12.08	25000	800000
	50-70	51	19.25	60000	3060000
	70-90	86	32.45	80000	6880000
	90+	96	36.23	100000	9600000
Cold/Dense Fog	> 50	47	17.74	25000	1175000
	50-70	59	22.26	60000	3540000
	70-90	83	31.32	80000	6640000
	90+	76	28.68	100000	7600000
Decline Ground Water	> 50	28	10.57	25000	700000
	50-70	59	22.26	60000	3540000
	70-90	87	32.83	80000	6960000
	90+	91	34.34	100000	9100000
Hailstorm	> 50	45	16.98	25000	1125000
	50-70	56	21.13	60000	3360000
	70-90	15	5.66	80000	1200000
	90+	149	56.23	100000	14900000



Most of the respondents face more than one calamity at a time that increases the amount of loss. Storm destroys more money of the respondent's money. Usually storm and hailstorm affect on the crops in ripping and before cutting period. Decline ground water level is the result of draught. Once upon a time before cutting the crops flood was coming and crops become damaged and sometimes lost the crops by destroying the houses. Cold or fog lost the crops during preparation of seeds bed and plantation.



The average loss of draught is 73,660.00 taka. The average loss of flood is 75,170.00 taka. The average loss of storm is 76,755.00 taka. The average loss of cold or fog is 71,528.00 taka. The average loss of decline ground water is 76,604.00 taka and the average loss of hailstorm is 77,679.00 taka.

8.9 Summary

The impact of climate on agricultural production is clear in many ways especially by natural calamities is mentionable. Climate impacts on crops production in seeds sowing, plant raising, harrowing, crops crushing etc. are common in the study area. It has negative impact on crops production by low production, re-plant raise, preservation etc. Agricultural production expenditure is increased by agricultural inputs and equipments. It also impact on crops marketing that make problems to the respondents. Climate has significant impact on food habits in the study area due to depends on the nature and kinds of crops production. Climate change creates the opportunities of multiple crops production that is playing significant role in increasing labor demand and price which help the improvement of laborer's livelihood. Overall some natural calamities like draught, flood, storm, cold or fog, decline ground water and hailstorm lost much more money for the respondents during 20-50 years. These problems are still facing the respondents in many ways but are trying to avoid the problems.

The respondents gave their answer on the impact of climate on crops production in which the time of seeds sowing 87.55 percent, plant raise is 86.79 percent, use of fertilizer is 61.13, harrowing is 51.70 percent, crops cutting is 90.19 percent and crops crushing is 98.11 percent. They also mentioned the negative impact of climate on crops production that are low production is 89.06 percent, re-plant raise 80.38 percent, a grain of paddy containing no rice is 86.79 percent, marketing problems is 66.42 and preservation problems is 88.30 percent. They gave their opinion on the impact of climate on the expenditure of crops production of which use of more plant is 91.32 percent, use of more labor is 92.45 percent, extra hard work is 90.19 percent, over use of fertilizer is 88.30 percent, use of more diesel is 86.04 percent, decline ground water level is 92.45 percent and early cutting is 44.53 percent. They also mentioned the impact of climate on crops marketing that are storm is 66.42 percent, rain/hailstorm is 69.06 percent, flood is 70.19 percent and dense fog is 42.64 percent. All the respondents said that impact of climate on food

habits is clear in the study area. There is an impact of climate on works/labor that are the creation of working areas is 76.98 percent, increase of labor price is 95.09 percent and increase of labor demand is 88.30 percent. They calculate an estimate loss for climate during 20-50 years in the study area. The average loss of draught is 73,660.00 taka. The average loss of flood is 75,170.00 taka. The average loss of storm is 76,755.00 taka. The average loss of cold or fog is 71,528.00 taka. The average loss of decline ground water is 76,604.00 taka and the average loss of hailstorm is 77,679.00 taka.

Agriculture depends on climate due to co-existence of natural calamities and agricultural production and natural calamities like draught, flood, storm/hailstorm, cold/dense fog, decline ground water are common that destroy the crops in many years in the study area.

End Note

[1.] Bangladesh agriculture is overwhelmingly rain-fed and highly vulnerable to floods, droughts, cyclones, tidal waves as well as river bank erosion (Chowdhury, 1995).

CHAPTER – NINE

QUALITATIVE DATA ANALYSIS

9.1 Introduction

In qualitative data analysis, data are collected through using the techniques and tools of Focus Group Discussion (FGD), Case Study and Key Informant Interview (KII).

9.2 Brief about the Participants in Focus Group Discussion (FGD)

Name of the Participant	Age (years)	Member of the households	Education	Occupation	Arable land (acr)	Homestead land (dec.)	Income (yearly Tk.)	Expenditure
Md. Abzal Hossain	50	04	Kamel	Teacher	1.67	12	1,70,000	1,20,000
Md. Zalal Uddin	48	05	Eight	Agriculture	1.34	05	1,00,000	95,000
Md. Matiur Rahman	70	03	Five	Agriculture	1.00	04	87,000	86,000
Md. Akkas Ali	38	04	Eight	Agriculture	1.00	4.5	98,000	95,000
Md. Altab Hossain	61	04	B.A.	Rt. teacher	3.00	14	84,000	80,000
Md. Mayeen Uddin	43	04	SSC	Agriculture	1.00	03	80,000	72,000
Md. Waheduzzaman	37	03	MSS	Lecturer	1.50	03	1,55,000	96,000

Fig-08: Participant's description in conducting FGD

9.2.1 Socio-Economic Conditions of the Participants

All the participants of the FGD are married, Muslims and head of the households. The average age of the participants is 49.57 years. The average members of the house holds are 4 in number. The average income of the participants is 1,10,571.00 taka per year. The average expenditure of the participants is 92,000.00 taka per year. The average savings of the participants is 18,571.00 taka per year. The average arable land of the participants is 01.50 acre and housing land is 06.50 decimal. Most of the participants completed their graduation degree.

9.2.2 Idea on Agricultural Production and Change

All of the participants say that agricultural production has been changed in many ways like multiple crops production, production amount, species, components of crops production etc. Those who produce rice they can only produce rice due to late starting

in production functions. Those who produce maize they can also produce amon or jute after taking the maize. Those who produce wheat they can produce amon or jute after taking the wheat. All the people produce rice. Those who produce rice they also produce few amount of other crops that helps to their domestic needs and profit as well.

About 27.54 percent produce maize of which 20.45 percent produce amon and 55.00 percent produce jute after taking the maize. About 16.27 percent produce wheat of which 70.00 percent produce amon and 30.00 percent produce jute after taking the wheat. High Yielding Varieties (HYV) and Modern Varieties (MV) are being produced more in the study area that is helpful for production more. Chemical fertilizer and pesticides are used more in the study area that is also helpful for production more. Rice is produced more or less 84-90 mounds per acre, maize is produced 105-120 mounds per acre, amon is produced 12-15 mounds per acre, wheat is produced 36-45 mounds per acre and jute is produced 10-15 mounds per acre. The production expenditure per acre varies for the owner and non-owner farmers, qualities of soil and environment.

Those who cultivate their own lands, their expenditure are 18,000.00-21,000.00 taka per acre and price of their production is 40,000.00-45,000.00 taka per acre. On the other hand those who cultivate lands by taking lease, their production expenditure are 33,000.00-36,000.00 taka per acre. The maize production expenditure of owner is 35,000.00-40,000.00 taka per acre and price of their production is 55,000.00-60,000.00 taka per acre. On the other hand those who cultivate lands by taking lease, their production expenditure are 40,000.00-45,000.00 taka per acre. The amon production expenditure of owner is 3,000.00-4,000.00 taka per acre and price of their production is 9,000.00-12,000.00 taka per acre. On the other hand those who cultivate lands by taking lease, their production expenditure are 8,000.00-9,000.00 taka per acre. The wheat production expenditure of owner is 12,000.00-15,000.00 taka per acre and price of their production is 30,000.00-35,000.00 taka per acre. On the other hand those who cultivate lands by taking lease, their production expenditure are 17,000.00-20,000.00

taka per acre. The jute production expenditure of owner is 4,000.00-5,000.00 per acre and price of their production is 9,000.00-12,000.00 taka per acre. On the other hand those who cultivate lands by taking lease, their production expenditure are 9,000.00-10,000.00 taka per acre. This price varies in time and on other conditions.

Once upon a time basket, doan, power pump were used for irrigation that supplied surface water mostly. Now all use shallow machine and mortar that supply ground water mostly.

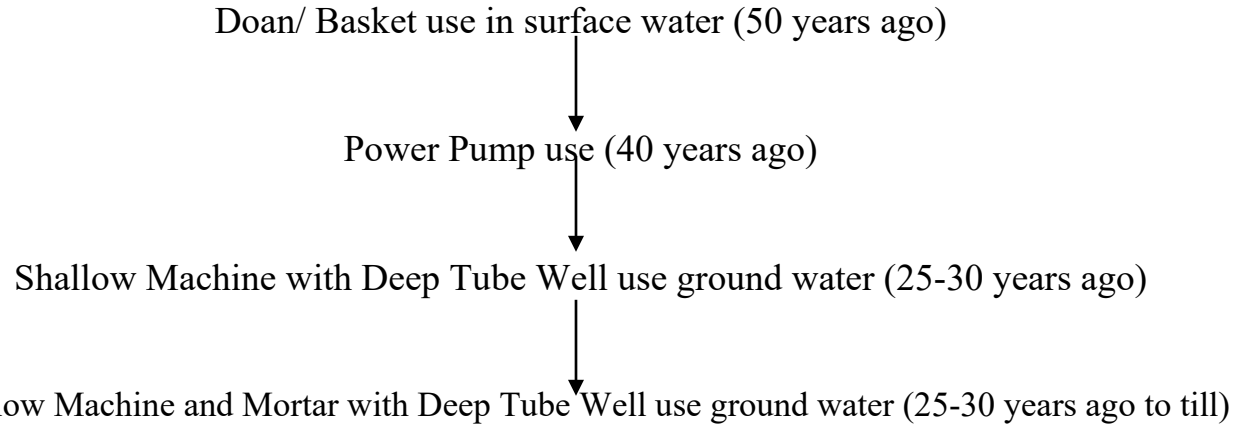


Fig-09: Changing pattern of irrigation

Local or traditional species of seeds were used in 20-25 years ago. At present all the respondents use HYV.

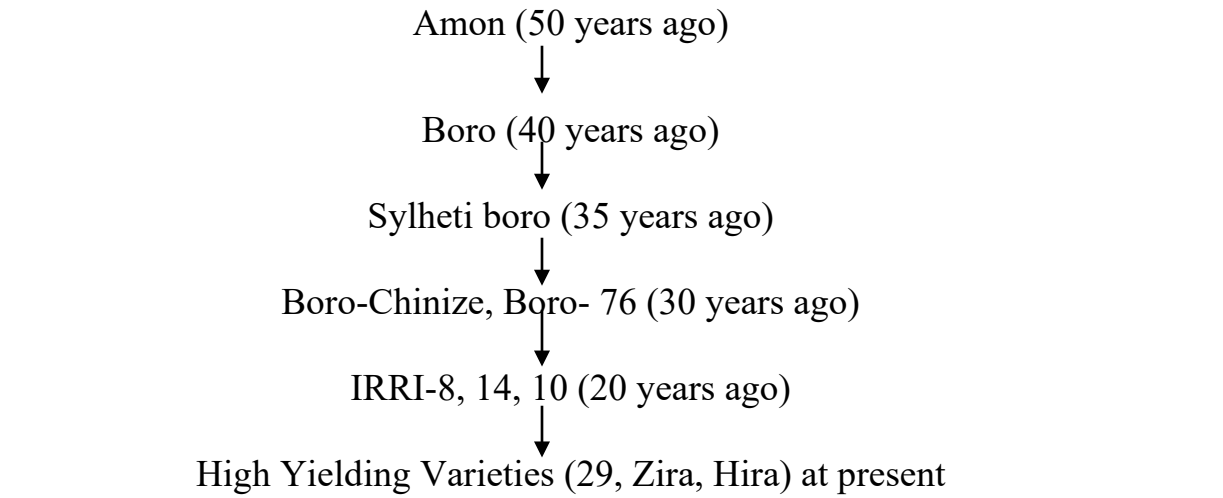


Fig-10: Changing pattern of using seeds

Now chemical fertilizer and pesticides are used more in the study area. They said, over all agricultural production and agricultural change is clear to the rural people. There is

a major change found in cultivation. Once upon a time plough was used, about 30 years ago tractor was used, now power tiller is used since 20 years ago. Change is also found in crushing activities. Molon, barrel and few cases machine were used for crushing. At present all the respondents and people as well use whopper machine locally popular as *Vut Machine* that is less time consuming and rapidly working.

9.2.3 Problems of Agricultural Change

There are some problems in irrigation system such as decline ground water level, dry river, electricity crisis, bore damage, increase of diesel price, draught etc. The problems of seed are fewer seedlings of packet seeds, species problem of open seeds. Problems in using chemical fertilizer are low production for more use, decreasing soil fertility; qualities are decreasing, lack of training. Problems of using pesticides are wants of qualities, ignorance of using, and decreasing worth-arm and other useful insects and birds. Problems of more production are decreasing soil fertility, lack of quality seeds, declining ground water level, and lack of training. There are some risks in agricultural production that are obstacle for more production and agricultural changes as well. The risks are fog or dense fog, hailstorm, insects, and decline of ground water.

9.2.4 Prospects of Agricultural Change

There are some prospects of irrigation that are electrical mortar connection, river dazing, and rubber Drum Bridge. Prospects of seeds are government initiatives, packet system. Prospects of using chemical fertilizer are no crisis, crop rotation or multiple crops production. Prospects of using pesticides are helping respective company agents, all are using. Prospects of more production are farmer's strength, high yielding varieties, development of communication system, government initiatives, educated people are involving in agricultural production activities.

9.2.5 Effects on Development

All of the participants say that the people of the study area directly or indirectly depend on agriculture. Their development depends on agriculture. In the study area development is clear in taking education, occupation, housing, achieving property,

purchasing domestic needs and over all livelihoods. If agricultural production and production price is high then their living pattern is developed. On the contrary if agricultural production and production price is low then their living pattern becomes below standards.

9.2.6 Recommendations

They mentioned some recommendations for the development of agriculture which are decrease of the price of agricultural tools, real price during crop cutting, ensure the qualities of fertilizer, active response of agriculture officer, regular soil test and giving priority to the agriculture.

9.3 Case Studies

Number of the Case Studies	Name	Occupation
Case-1	Md. Abdul Momin Sarker	Retired school teacher
Case-2	A.B.M. Salequl Islam	Lecturer
Case-3	Md. Morshed Alam	Farmer
Case-4	Md. Rojob Ali	Village doctor
Case-5	Md. Abdul Aziz	Fisherman

Fig-11: Brief about the respondents of case studies

9.3.1 Case-1

Md. Abdul Momin Sarker is 61 years old who was the headmaster of a primary school. He has two daughters and one son. Daughters are married and live in their husband's home. His only son is a lecturer of a college. He has 04.67 acre of arable land and 4.5 decimal of housing lands. Now he is engaged in agricultural activities. His father and grand father was a farmer. He completed his education in HSC. His only son lives away from him due to son's service. At present Mr. Sarker and his wife stay at home. He completed his children's education by dint of agricultural activities and service. His primary school was registered only and very few amounts got from the school but engaged for his dedication and honor. He has well sanitation and pure drinking water

system at his home. He has two rooms of which one is fence of tin and tin, and other is soil with tin that is two storied.

His yearly income is 1,50,000.00 taka which comes from agricultural activities. On the other hand yearly expenditure is 1,00,000.00 taka which is used in his domestic and necessary social activities. He cultivates 01 acre of land and the rest gives lease to other men. He cultivates IRR-29, wheat and maize. This production is only for fulfilling his domestic needs. He can not cultivate all lands due to old aged and lack of own manpower for supervision. He achieved land from his parents.

He said that there is a vast change found in agricultural production. Firstly, change is found in seeds and production rate. Once upon a time about 20-25 years ago only traditional crops were produced that was low production rate per acre. Now all the people are producing HYV crops that increases production rate per acre. Secondly, chemical fertilizer helps to more production. It was used less amount few years ago. Thirdly, ground water used by shallow machine is a common practice in the study area. Few are trying to use ground water by electric mortar. These are easier than others. In irrigation system once upon a time basket, doan, power pump use from surface water. Now it is so difficult in using surface water because of scarcity of the sources of surface water. Fourthly, pesticides are used more in the study area. Once upon a time it was only used in killing pests and other insects. At present is used in abolishing grass which is helpful to reduce the agricultural production cost. Fifthly, change is found in plough. Plough is used in harvesting later on tractor is used in harvesting and at present power tiller is used in cultivation that is cost consuming and easier for harvesting. Most of the people try to take their meal from their own rice.

He mentioned there are some problems in agricultural change and production as well. Using ground water more is creating tremendous pressure on ground water level because of ground water level is decreasing day by day. Seeds quality is another problem in agricultural change and agricultural production because scarcity of quality seeds some times make obstacle for the agricultural production. Use of more chemical fertilizer is decreasing soil fertility and farmers are not aware to test their soil and

using level of chemical fertilizer and pesticides. Pesticides use is killing useful insects that are helpful for the more agricultural production. As a result agro-ecology system is decreasing day by day. Land fragmentation is a problem for the agricultural change due to hindering modern input use. There are some natural risks in the agricultural change and production which are fog, hailstorm, rain and other natural calamities because most of the time rice is cut in the month of Bengali Baishak that is the time of storm and popular as *Kal Boishakhi Jhor.* In that time corps preservation, marketing, and communication problems are found more. Climate change is also effects on day laborer and food habits.

There are some prospects in agricultural change and agricultural production as well. In irrigation, electrical mortar connection helps to reduce production cost that is why some one is using such system. River dazing can help to use surface water and reduce production costs. Rubber Drum Bridge can also help the use of surface water. Government initiatives are helpful for the agricultural change that is also helpful for more profit. Prospects of using chemical fertilizer are that now no crisis in the market and other respective areas. Multiple crops production is helpful for production more and profit, and indicates the agricultural change. Respective company agents help to the farmers why, how and in which way pesticides will be used in the field. As a result all are using pesticides. Farmer's strength is a significant input of more production and agricultural change. High Yielding Varieties is helpful to the agricultural change. Development of communication system, educated peoples' involvement is other factors that help to the agricultural change and agricultural production as well.

He said that development depends on agriculture in the study area. Development is found in many indicators like taking children's education, occupation, income, housing pattern, sanitation, domestic materials and over all livelihoods. These developments depend on agricultural change and production because of any calamities can destroy their production and becomes helpless at that time. On the other hand secured agricultural production ensures the development of the rural people.

He thinks that some steps should be taken for the development of agriculture such as supply quality seeds, fertilizer; arrange training for the farmers, regularly soil test, easy loan arrangement, dazing cannel-river, widely use of electric mortar and other facilities which are needed for the farmers by the government.

9.3.2 Case-2

A.B.M. Salequl Islam (Shobuj) is 35 years old who is a lecturer of a non-government college. He has two children. His household's members are 12 in number. They are in joint family. Formally his mother is the head of the household but all familial activities are maintained by Mr. Islam. His father was a school teacher and well known to all as BSc teacher. He was respected by all in the study area. His father died few years ago. He has 09.33 acre of arable land and 36 decimal of housing lands. Now he is engaged in agricultural activities besides his service. His father was a teacher and grand father was a farmer. He completed his education in MA. His three brothers completed master degree and now a sister is reading in 3rd year of MBBS degree. They completed their education by dint of agricultural activities and father's service.

His familial yearly income is about 5,00,000.00 taka which comes from agricultural activities and service. On the other hand yearly expenditure is around 4,00,000.00 taka which is used in his domestic and necessary social activities. He produces 03.33 acre of land and the rest keep mortgage to other men during the treatment of his father. He cultivates IRR-29, wheat and maize. This production is for fulfilling his domestic needs from gaining profit. He achieved 50.00 percent land from his parents and rest of from purchasing.

He said that there is a remarkable change found in agricultural production. Use of ground water by shallow machine is common practice in the study area. Few are trying to use ground water by electric mortar. These are easier than others. In irrigation system once upon a time basket, doan, power pump were used from surface water. Now it is so difficult in using surface water because of scarcity of the sources of surface water. Change is found in seeds and production rate. Once upon a time only traditional and local crops were produced that was low production rate per acre. Now

all the people are producing HYV crops that increases production rate per acre. Chemical fertilizer helps to more production. It was used less amount 20-25 years ago. Pesticides are used more in the study area. Once upon a time it was only used in killing pests and other insects. At present is used in abolishing grass which is helpful to reduce the agricultural production cost. Change is found in plough. Plough is used in harvesting later on tractor is used in harvesting and at present power tiller is used in cultivation that is cost consuming and easier for harvesting. Most of the people try to take their meal from their own rice.

He told that there are some problems in agricultural change and agricultural production as well. Decreasing of ground water level is the cause of over using ground water. Seeds quality is a problem in agricultural change and agricultural production because scarcity of quality seeds some times make obstacle for the agricultural production. Use of more chemical fertilizer is decreasing soil fertility and farmers are not aware to test their soil and using level of chemical fertilizer and pesticides. Pesticides use is killing useful insects that are helpful for the more agricultural production. As a result agro-ecology system is decreasing day by day. Land fragmentation is a problem for the agricultural change due to hindering modern input use. There are some natural risks in the agricultural change and production which are fog or dense fog, hailstorm etc. In that time corps preservation and marketing problems are found more. Climate change is also effects on food habits in the study area. About 30 years ago people ate shaluk, kaon, later on wheat, barley and at present maize and rice. But rice is common to all.

There are some prospects in agricultural change and agricultural production as well. In irrigation, electrical mortar connection helps to reduce production cost that is why some one is using such system. River dazing can help to use surface water and reduce production costs. Government initiatives are helpful for the agricultural change that is also helpful for more profit. Prospects of using chemical fertilizer are that now no crisis in the market and other respective areas. Crop rotation is helpful to more production and profit, and indicates the agricultural change. Farmer's mind set and strength is a significant input for more production and agricultural change. High

Yielding Varieties is helpful to the agricultural change. Development of communication system is other factor that helps to the agricultural change and agricultural production.

He mentioned that development depends on agriculture in the study area because of the dependency on agriculture. Development is found in many indicators like taking children's education, occupation, income, expenditure, savings, housing pattern, sanitation etc. These developments depend on agricultural change and production because of any calamities can destroy their production and becomes helpless at that time. On the other hand secure agricultural production ensures the development of the rural people. It also depends on favorable environmental conditions.

He thinks that some steps should be taken for the development of agriculture such as arranging training for the farmers, soil test, dazing cannel-river, widely use of electric mortar are mentionable and other facilities which are needed for the farmers by the government and non-government organization. More research regarding agriculture should be conducted regularly.

9.3.3 Case-3

Md. Morshed Alam is 37 years old who is a businessman and engage in agricultural activities. He has one child. He has 8.67 acre of arable land and 09.00 decimal of housing lands. His father and grand father was a farmer. He completed his education in HSC. His children are school going. Children's education is carrying by dint of agricultural activities business. His surplus value of money from agriculture invests into business.

His yearly income is 4,50,000.00 taka which comes from agricultural activities and business. On the other hand yearly expenditure is about 2,50,000.00 taka which is used in his domestic and necessary social activities. He produces 8.67 acre of land by maintaining row which helps to production more and get average 93 mounds per acre. He cultivates only IRR-29. This production is for fulfilling his domestic needs and expansion of his business. He achieved land from his parents and by purchasing.

He said that there is a change found in agricultural production that is production rate per acre, now all the people are producing HYV crops that increases production rate per acre, chemical fertilizer is used more and helps to more production, ground water used by shallow machine is common practice in the study area, some are trying to use ground water by electric mortar, in irrigation system once upon a time basket, doan, power pump were used from surface water, now it is so difficult in using surface water because of scarcity of the sources of surface water, pesticides are used more in the study area, at present it is used in abolishing grass which is helpful to reduce the agricultural production expenditure, most of the people try to take their meal from their own rice.

He mentioned that there are some problems in agricultural change and production as well. Using ground water more is creating tremendous pressure on ground water level because of ground water level is decreasing day by day. Seeds quality is another problem in agricultural change and agricultural production because scarcity of quality seeds some times make obstacle for the agricultural production. Use of more chemical fertilizer is decreasing soil fertility. Pesticides use is killing useful insects that are helpful for the more agricultural production. As a result agro-ecology system is decreasing day by day. There are some natural risks in the agricultural change and production which are fog, storm, rain and other natural calamities.

There are some prospects in agricultural change and agricultural production as well. In irrigation- electrical mortar connection helps to reduce production cost that is why some one is using such system. Rubber Drum Bridge help the use of surface water. Government initiatives are helpful for the agricultural change that is also helpful for more profit. Multiple crops production is helpful to more production and profit, and indicates the agricultural change. Farmer's strength is a significant input of more production and agricultural change. High Yielding Varieties is helpful to the agricultural change. Development of communication system helps to the agricultural change and agricultural production as well.

He said that obviously development depends on agriculture in the study area. Development is found in many indicators like taking children's education, occupation, income, housing pattern, sanitation, domestic materials and over all livelihoods. These developments depend on agricultural change and production because of any calamities can destroy their production and becomes helpless at that time. On the other hand secured agricultural production ensures the development of the rural people.

His proposal for the development of agriculture is that some steps should be taken such as supply of quality seeds, fertilizer, soil test, easy loan arrangement, widely use of electric mortar and other facilities which are needed for the farmers by the government and non-government organization in the study area.

9.3.4 Case-4

Md. Rajob Ali is 35 years old who is a rural doctor. He has one son. He has 01.08 acre of arable land and 7.5 decimal of housing lands. He cultivates his land. His father and grand father was a farmer. He completed his education in HSC. He has a dispensary at the Bilshsa bazar. He invests surplus value of agricultural production in his dispensary. He is popular and well known to all as doctor.

His yearly income is 1,80,000.00 taka which comes from his medical business and agricultural activities. On the other hand yearly expenditure is 72,000.00 taka which is used in his domestic and necessary social activities. He produces his total land. He cultivates IRR-29 and zira. This production helps to fulfill his domestic needs and uses medical business by surplus value. He achieved land from his parents and buying.

He said that there is a remarkable change found in agricultural production in the study area. Changes are found in crops production, production materials and tools, consciousness and other many activities. Once upon a time about 20-25 years ago only traditional crops were produced that was low production rate per acre. Now all the people are producing HYV crops that increases production rate per acre. Chemical fertilizer helps to more production that was used less amount few years ago. Ground water used by shallow machine is common practice in the study area. Few are trying to use ground water by electric mortar. These are easier than others. In irrigation system

once upon a time basket, doan, power pump use from surface water. Now it is so difficult in using surface water because of scarcity of the sources of surface water. Pesticides are used more in the study area that was only used in killing pests and other insects. At present it is used in abolishing grass which decreases soil fertility. Change is found ploughing. Plaugh is used in harvesting later on tractor is used in harvesting and at present power tiller is used in cultivation that is cost consuming and easier for harvesting. Most of the people try to take their meal from their own rice and change is also found in food habits due to use of maize.

He mentioned there are some problems in agricultural change. More using of ground water is creating huge pressure on ground water level because of ground water level is decreasing day by day. Seeds quality is another problem in agricultural change and agricultural production because scarcity of quality seeds some times make obstacle for the agricultural production. Use of more chemical fertilizer is decreasing soil fertility and farmers are not aware to test their soil and using level of chemical fertilizer and pesticides. On the other hand no officials come to field for testing the soil of arable lands. Pesticides use is killing useful insects that are helpful for the more agricultural production that also decreasing agro-ecology system day by day. Land fragmentation is another problem for the agricultural change due to hindering modern input use. There are some natural risks in the agricultural change and production which are fog, hailstorm, rain and other natural calamities because most of the time rice is cut in the month of bengali Baishak that is the time of storm which is popular as *Kal Boishakhi Jhor*. In that time corps preservation, marketing, and communication problems are found more. Climate change is also effects on day laborer and food habits. Any other natural calamities create pressure on agricultural production that is also problems of agricultural change.

Though some problems are found in the agricultural change, there are some prospects in agricultural change and agricultural production as well. In irrigation, electrical mortar connection helps to reduce production cost that is why some one is using such system. It should be widely used in the study area. There is a river and cannel in the

study area that dazing can help to use surface water and reduce production costs. Rubber Drum Bridge also helps the use of surface water. Government initiatives are helpful for the agricultural change that is also helpful for more profit. Prospects of using chemical fertilizer are that now no crisis in the market and other respective areas. Multiple crops production is helpful to more production and profit, and indicates the agricultural change. Respective company agents help to the farmers why, how and in which way pesticides will be used in the field. As a result all are using pesticides. Farmer's strength is a significant input of more production and agricultural change. High Yielding Varieties is helpful to the agricultural change through widely uses and production rate per acre. Development of communication system, educated peoples' involvement is other factors that help to the agricultural change and agricultural production as well.

He clearly said that development depends on agriculture in the study area. Development is found in many socio-economic indicators like children's education, occupation, income, housing pattern, sanitation, domestic materials and over all living pattern. These developments depend on agricultural change and production because of any calamities can destroy their production and becomes helpless at that time. On the other hand secured agricultural production ensures the development of the rural people.

He proposes that some steps should be taken for the development of agriculture such as ensure quality seeds, fertilizer; arrange training for the farmers, regularly soil test, easy loan arrangement, dazing cannel-river, widely use of electric mortar and other facilities which are needed for the farmers by the government and non-government organization. These steps can help the agricultural change and production more that will also be helpful to the development of rural people.

9.3.5 Case-5

Md. Abdul Aziz is 56 years old who is a fisherman and he has two sons. One son completed master degree and another is involved in catching fish. He has no arable land and 01 decimal of housing land. His father and grand father were fishermen. He is

illiterate and did not complete his education due to lack of consciousness. Besides this once upon a time the fish was found more in the *Chalon Beel* area and he thought that no need to be educated rather catching fish will give him peace and solvency in the future. His yearly income is near about 30,000.00 taka which comes from catching fish. On the other hand yearly expenditure is 30,000.00 taka and sometimes more which is used in his domestic activities.

There are some households live in the study area that are catching and selling fish from generation to generation. Once upon a time or 20-50 years ago more than 100 households were catching fish. Now only 65 house holds are catching fish. Those who catch fish are called fishermen and know to all as *Nikari or ziani.* At present there is a remarkable crisis in catching fish due to the scarcity of fish. Few years ago amon was produced more in the study area that was helpful for the fish. Now in the rainy season there is no scope to feed the fishes. So scarcity of fish is increasing day by day and in the summer season river and cannel is dried and no water is found for at least one or two months.

He said that we did not think that such crisis would be created at present and we don't know what will be happened in the future. Once upon a time only fishermen caught fish and no other men were involved in catching fish. In such cases other men were rebuked or punished by the *samaj*. Now it is not followed in the study area. As a result many other men except fishing community are involving in catching fishes. Sometimes real fishing community is being deprived in catching fishes. Seasonal fishermen catch fish by many ways like nets, *suti*, rearing fishes etc. In summer season all ponds and cannels are occupied as leased by the non-fishing community. This chance can not be availed by the fishermen due to lack of money or poverty as well. As a result about 3-4 months they can not catch fish from ponds, river and even from cannel. In that time fisherman wants other works besides their traditional works. Most of the cases they become day laborer and feel unhappy in their positions.

He said that he is not involved in agricultural production and related activities but in his life time he found a major change in agricultural production. 20-25 years ago only

traditional crops were produced that was low production rate per acre. Now all the people are producing HYV and MV crops that increases production rate per acre. Chemical fertilizer helps to more production and it was used less in amount few years ago which is frequently and over used at present. In irrigation system once upon a time basket, doan, power pump were used from surface water. Now it is so difficult in using surface water because of scarcity of the sources of surface water that is why all are using ground water in the study area. Pesticides are used more in the study area. Once upon a time it was only used in killing pests and other insects. At present is used in abolishing grass. Plaugh is used in harvesting later on tractor is used in harvesting and at present power tiller is used in cultivation that is cost consuming and easier for harvesting.

He mentioned, there are some problems in agricultural change and production as well which are using ground water more creates pressure on ground water level, scarcity of quality seeds, over use of chemical fertilizer is decreasing soil fertility, pesticides use is killing useful insects that are helpful for the more agricultural production but agro-ecology system is decreasing day by day. There are some natural risks in the agricultural change and production which are fog, hailstorm, rain and other natural calamities. In that time crops preservation, marketing, and communication problems are found more. Climate change is also effects on day laborer and food habits.

There are some prospects in agricultural change and agricultural production as well. In irrigation, electrical mortar connection helps to reduce production cost that is why some one is using such system. Rubber Drum Bridge also helps the use of surface water. Government initiatives help for the agricultural change that is also helpful for more profit. No scarcity of chemical fertilizer in the market and other respective areas. Multiple crops production is helpful to more production and profit, and indicates the agricultural change. High Yielding Varieties and Modern Varieties are helpful to the agricultural change. Development of communication system, educated peoples' involvement is other factors that help to the agricultural change and agricultural production.

He said that most of the people in the study area depend on agriculture so, peoples development depends on agriculture in the study area no doubt about it. Development is found in many cases like children's education, occupation, income, housing pattern, sanitation and domestic materials. These developments depend on agricultural change and production because of any calamities can destroy their production and becomes helpless at that time. On the other hand secure agricultural production ensures the development of the rural people.

He mentioned that some steps should be taken for the development of agriculture such as supply of agricultural inputs, soil test, easy loan arrangement, widely use of electric mortar and other facilities which are needed for the farmers that will help the rural people.

9.4 Key Informant Interview (KII)

Number of the KII	Name	Occupation
KII-1	Md. Monirul Islam	Chairman, Union Parishad
KII-2	Md. Abdul Hannan Sarker	Principal
KII-3	Mst. Josna Begum	Member, Union Parishad
KII-4	Bablu Kumar Sutradar	Agriculture Officer
KII-5	Abu Bkhtear Md. Feroj	Lecturer

Fig-12: Brief about the key informant interview

9.4.1 KII-1

Md. Monirul Islam is well known to all as the name of Dolon who is a chairman of Kubjipur Union Parishad no. 3 of Gurudaspur Upazilla under the district of Natore. He said that at present there are some crops like boro rice, amon, wheat, maize and jute are produced in the study area.

He mentioned that the nature of agriculture has been changed in different sectors of crops production. In irrigation system, once upon a time doan, basket, and power pump were used more and collect water from surface water. Now all the people use shallow machine and mortar with deep tube well and collect ground water in the study area that is comparatively easier to the people. All are producing hybrid rice which is helpful to production more. Few years ago people produced local crops that were low production

rate per acre. Now nobody produce traditional or local crops. Chemical fertilizer is used more that helps more production. This practice was low 20-25 years ago due to uninteresting of the people and using practice of organic fertilizer. Pesticides use helps to decrease labor cost in agricultural production. At present pesticides is not only used for killing insects but also used for diminishing grass in the study area. There is a remarkable change found in land use such as no pasture land found in the study area. All are trying to produce some kinds of crops in their land. On the other hand a large number of non owners of land are producing crops by taking lease. So, agricultural change has been found in the study area no doubt about it.

There are some problems in agricultural change and production as well. The high price of agricultural inputs is a major problem in agricultural production. It increases the cost of agricultural production. Those who produce in shallow machine high rate of diesel price creates obstacle on production cost. Decline of ground water is a problem and one of the major concerns to the farmers due to decreasing the level day by day. This crisis becomes a vital threat in the month of April to mid May. Some times seeds are not found best quality from open market or even at packet. The quality of fertilizer especially TSP and Phosphate has been decreased. As a result fertilizer is used more that increases the production cost. Pesticides use is killing many useful insects and decreasing soil quality. Sometimes farmers become hopeless during the time of crops cutting due to low price of agricultural production. Those who produce by taking lease their benefit is not high than the land owner. So, these problems create obstacle to agricultural change and production as well.

Mr. Islam mentioned some prospects in the agricultural change. In the irrigation system there is an opportunity to use surface water from the river and cannel. On the other hand electric mortar is being used in the study area that reduce production cost. People are awaking to collect and preserve quality seeds in the study area and using HYV production increases more production per acre. It is quite impossible to produce crops with out chemical fertilizer. Use of chemical fertilizer helps to more production. Pesticides use is increasing production per acre. Multiple crops production is

increasing day by day that help to profit more. Communications opportunities are creating in the study area that reduces the carrying cost of the agricultural production in the study area.

He said that there is an important correlation between agricultural change and development. Most of the people are directly and indirectly depending on agriculture in the study area. So, if agricultural production is more then their lifestyle becomes better. On the contrary, if production is low then their lifestyle is low at that time. Besides these there is a remarkable change found in the development of occupation, education, sanitation, housing pattern, living standard and so one.

He said that there is a relationship between agriculture and climate or environment. Any natural calamities create problems in the agricultural production. Fog and cold weather create problems during plantation. Hailstorm or storm like *Kal Boishakhi Jhor* is a major problem and risk for the agricultural production and change as well. Rain is another environmental problem that creates problem in the agricultural production. Rice is ripen and cut during the period of the late April and that is the time of storm like *Kal Boishakhi Jhor.*

Mr. Islam mentioned that agro-ecology system has been decreased in the study area due to over use of chemical fertilizer, pesticides and ground water in the study area. Once upon a time many birds and useful insects were found in the study area that was helpful for more agricultural production. Decreasing agro-ecology is creating problem in the crops production.

It is clearly found that there is a mentionable change found in the agricultural production during 50 years in crops production rate per acre, multiple crops production, production materials, people's awareness and other agricultural activities in the study area.

Mr. Islam gave opinion for the development of agriculture that will help the development of the rural people. He mentioned widely electric mortar should be used and production cost will be reduced that helps the people for production more. Increase of subsidy in the agricultural sectors, ensure easy loan system for the farmers, supply

the quality seeds and fertilizer and arrange the training for the farmers how to use chemical fertilizer and pesticides. There is a river and cannel in the study area that may be the best source of surface water and fish by dazing. This river and cannel dazing may make a berry bud that may use in communication and plantation for the balanced creation of ecosystem and suitable environment for the chalon beel area. This dazing will reduce the use of ground water and will create agriculture in a friendly environment, other wise the chalon beel area will be a desert area that will also be the threat of agricultural production and agricultural change. Finally, more empirical study should be conducted in the chalon beel area regarding agricultural activities that will be helpful for agricultural production more and development as well.

9.4.2 KII-2

Md. Abdul Hannan Sarker is the principal of the Bill Chalon Multilateral High School and College at Bilsha of Gurudaspur Upazilla under the district of Natore. He said that at present there are some crops like boro rice, amon, wheat, maize and jute produce in the study area. Most of the farmers produce IRR-29 and Zirashail. Farmers are producing their own land and by taking lease and mortgage. In mortgage system about 1,20,000 Tk. to 1,50,000 Tk. per acre have to be paid to the land owner and in lease system about 15,000 Tk. per acre have to be paid to the land owner for one year. This amount of money depends on the production of agriculture, price of agricultural production, soil qualities of arable land and competition as well.

Mr. Sarker mentioned that the nature of agriculture has been changed in the study area in different sectors of crops production. In irrigation system, now all the people use shallow machine and mortar with deep tube well and collect ground water in the study area that is comparatively easier to the people. Few years ago doan, basket, and power pump were used more and collected water from surface water. All are producing HYV boro rice for production more. Few years ago people were produced local crops that were low production rate per acre. Now nobody produce traditional or local crops. Chemical fertilizer is used over that helps more production. This practice was low some years ago due to uninteresting of the people and using practice of organic

fertilizer. Pesticides used helps to decrease labor cost in agricultural production. At present pesticides is not only used for killing insects but also use for diminishing grass in the study area. People are trying to produce some kinds of crops in their land. On the other hand a large number of non owners of land are producing crops by taking lease in the study area. Lease system has been developed in one year in the study area.

He said there are some problems in agricultural change and production as well. The high price of agricultural inputs is a major problem in agricultural production. It increases the cost of agricultural production. High rate of diesel price creates obstacle on production cost. Decline of ground water is a problem and one of the major concerns to the farmers. In some cases seeds are not found in best quality from open market or even at packet. The quality of fertilizer has been decreased. As a result fertilizer is used more that increases the production cost. Pesticides use is killing many useful insects and decreasing soil quality. Farmers become hopeless during the time of crops cutting due to low price of agricultural production. Those who have no arable lands they are producing more by taking lease and their benefit is not higher than the land owner.

Mr. Sarker mentioned some prospects in the agricultural change. In the irrigation system there is an opportunity to use surface water from the river and cannel. On the other hand electric mortar is being used in the study area that reduces production cost. People are awaking to collect and preserve quality seeds in the study area and using HYV production increases more production per acre. It is quite impossible to produce crops without chemical fertilizer. Multiple crops production is increasing day by day that help to profit more. Communications opportunities are creating in the study area that reduces the carrying cost of the agricultural production. A bridge is creating a nice opportunity in the chalon beel area. The demand of straw is another source of money from agriculture. A temporary business system is developing on the basis of straw. This business is continuing during rainy season.

He said that there is an important relationship between agricultural change and development in the study area. Most of the people depend on agriculture. So, if

agricultural production is more then their lifestyle is better. On the contrary, if production is low then their lifestyle is low at that time. Besides these there is a remarkable change found in the development of occupation, education, sanitation, housing pattern, domestic goods, using luxurious goods even in over all life style.

Mr. Sarker said that the relationship is found between agriculture and climate or environment. Fog and cold weather create problems during plantation. Hailstorm or storm like *Kal Boishakhi Jhor* is a major problem and risk for the agricultural production and change as well. Rain creates problem in the agricultural production. Rice is ripened and cut during the period of the late April and that is the time of storm like *Kal Boishakhi Jhor.* As a result agricultural profit is becoming poor during the time. Yet in some years the effect of *Kal Boishakhi Jhor* is low on the agricultural production.

He mentioned that agro-ecology system has been decreased in the study area due to over use of chemical fertilizer, pesticides and ground water. As a result soil quality is decreasing day by day. But nobody test their soil and nobody came at the study area for testing the soil quality. Once upon a time many birds and useful insects were found in the study area that was helpful to more agricultural production. Decreasing agro-ecology is creating problem in the crops production by more needs of using fertilizer, pesticides and ground water.

It is explicitly found that there is a change in the agricultural production during 50 years in many areas like crops production rate per acre, multiple crops production, production materials, people's awareness and increasing attachment in agricultural activities.

Mr. Sarker gave opinion for the development of agriculture that will help the development of the rural people. He mentioned widely electric mortar should be used and production cost will be reduced that helps the people for production more. He said that electric mortar can reduce cost about ¾ portions in irrigation. Increase of subsidy in the agricultural sectors especially in diesel, ensure easy loan system for the farmers, arrange the training for the farmers how to use chemical fertilizer and pesticides and

regularly soil test. There is a river and cannel in the study area that may be the best source of surface water and fish by dazing and this dazing will reduce the use of ground water. Develop deep system like barind tract. Agricultural research might be helpful for the development of agricultural production and change.

9.4.3 KII-3

Mst. Josna Begum is a reserve seated member of 1, 2 and 3 no. ward of the Kubjipur Union Parishad no. 3 of Gurudaspur Upazilla under the district of Natore. She has been working as an elected member since 1997. She said that boro rice, amon, wheat, maize and jute are produced in the study area.

She mentioned that the nature of agriculture has been changed. In irrigation system, once upon a time doan, basket, and power pump were used more and collected water from surface water. At present all the people use shallow machine and mortar with deep tube well and collect ground water in the study area that is comparatively easier to the people. All are producing hybrid rice which increases agricultural production. Few years ago people produced local crops that were low production rate per acre. Now nobody produce traditional or local crops. Chemical fertilizer is used more. This practice was low some years ago due to disinterest of the people and using practice of organic fertilizer. At present pesticides is not only used for killing insects but also used for diminishing grass in the arable land. There is a remarkable change found in land use for multiple crops production. All are trying to produce some kinds of crops in their land.

There are some problems in agricultural change and production as well. The high price of agricultural inputs is a major problem in agricultural production. It increases the cost of agricultural production. Those who produce in shallow machine high rate of diesel price creates obstacle on production cost. Decline of ground water is a problem and one of the major concerns to the farmers due to the decreasing of the level day by day. This crisis becomes a vital threat in the month of April to mid May. Some times seeds are not found in best quality from open market or even at packet. The quality of fertilizer has been decreased. Pesticides use is killing many useful insects and

decreasing soil quality. Soil fertility is decreasing day by day. Sometimes farmers become hopeless during the time of crops cutting due to low price of agricultural production.

Mrs. Begum mentioned some prospects in the agricultural change and production as well. In the irrigation system electric mortar is being used in the study area that reduces production cost. People are awaking to collect and preserve quality seeds and using HYV production increases more production per acre. Agriculture office advises and encourages the farmers to collect self seeds. Use of chemical fertilizer helps to more production. Pesticides use is increasing production per acre. Multiple crops production is increasing day by day that help to profit more. Communications opportunities by bridge are creating in the study area that reduces the carrying cost of the agricultural production of the farmers. The positive effects of Green Revolution on agricultural production and change are found in the study area.

She said that there is an important relation between agricultural change and development in the study area. Most of the people are directly and indirectly depending on agriculture. So, if agricultural production is more then their lifestyle is better. On the contrary, if production is low then their lifestyle is low at that time. Besides these there is a mentionable change found in the development of occupation, education, sanitation, housing pattern and opportunities and so one in the study area.

She said that there is a relationship between agriculture and climate or environment. Any natural calamites create problems in the agricultural production. Fog and cold weather create problems during plantation. Hailstorm or storm like *Kal Boishakhi Jhor* is a major problem and risk for the agricultural production and change as well. Rain is another environmental problem that creates obstacle in the agricultural production in the cutting, collecting and preservation of crops. *Kal Boishakhi Jhor* in the month of Bengali Baishak creates problems on crops production especially on rice production.

Mrs. Begum mentioned that agro-ecology system has been decreased in the study area due to over use of chemical fertilizer, pesticides and ground water. The clay of soil has been degraded that is decreasing the quality of soil and soil fertility as well. Birds and

useful insects are rare found at present while were found in the study area that was helpful to more agricultural production. Decreasing agro-ecology is creating problem in the crops production.

She said it is clearly found that there is a mentionable change in the agricultural production during 50 years in crops production rate per acre, multiple crops production, production materials, people's awareness and other agricultural activities. She also mentioned that prospects are more than problems of agricultural change and production. Profit is found and people are interested on agricultural production.

Mrs. Begum gave opinion for the development of agriculture that will help the development of the rural people. She mentioned widely electric mortar should be used and production cost will be reduced at least ¾ portion that helps the people for production more. Increase of subsidy in the agricultural sectors, ensure easy loan system for the farmers, supply the quality seeds and fertilizer and arrange the training for the farmers how to use chemical fertilizer and pesticides. River and cannel dazing will reduce the use of ground water that will cost effective.

9.4.4 KII-4

Bablu Kumar Sutradhar is the Agriculture Officer of Gurudaspur Upazilla under the district of Natore. He said that now boro, amon, wheat, maize, jute, onion and mustard are produced in the study area.

He mentioned that agricultural nature has been changed in the study area in different sectors of crops production. This change is found in crops production and ways of crops production like irrigation system, HYV rice production. Few years ago people produced local crops that were low production rate per acre. Now nobody produce traditional or local crops. Chemical fertilizer is used more that helps more production. This practice was low some years ago. Pesticides use in decreasing labor cost in agricultural production due to use for abolishing grass. Arable land use is increasing day by day. All are trying to produce some kinds of crops in their land for their domestic needs and solving financial needs. Non owners of land are interesting to

produce different kinds of crops for the financial benefit that helps to improve their life style. So at a glance we can say agricultural change is found in the study area.

Mr. Sutradhar mentioned there are some problems in agricultural change and production as well. These are high price of agricultural inputs, high rate of diesel price, decline of ground water level, lack of awareness in preservation of quality seeds of the farmers, over use of chemical fertilizer and pesticides that decrease soil quality, low price of agricultural production during crops taking, the profit is less in the rice production, lack of communication system and lack of proper training of the farmers. Fragmentation of land is another problem in the more production and agricultural change.

He also mentioned some prospects in the agricultural change. These are electric mortar is using in the study area that is cost effective, people are awaking to collect quality seeds by dint of the activities of agriculture office, HYV production increases more production per acre, no crisis of chemical fertilizer, pesticides use is increasing production per acre, two or three types of crops are producing besides one that help to profit more, and production has been increased. Farmer's strength and their efforts help to the development and change of agriculture.

Mr. Sutradhar said that there is an important relationship between agricultural change and development. All the people directly and indirectly depend on agriculture in the study area. Their familial activities are affected by the agricultural production. That is why if agricultural production is more then their lifestyle is better and if production is low then their lifestyle is low at that time. Agricultural change plays significant role on occupation, education, sanitation, housing pattern development in the study area.

He said that there is a significant relation between agriculture and climate or environment. Any natural calamites create problems in the agricultural production. Fog and cold weather create problems during plantation. Hailstorm or storm is a risk for the agricultural production and agricultural change as well. Rain is another environmental problem that creates problem in the agricultural production. There is an impact of climate change on agricultural production.

Mr. Sutradhar mentioned that agro-ecology system has been decreased in the study area due to over use of chemical fertilizer, pesticides and ground water. Birds and useful insects were found more that was helpful to more agricultural production. Now it is rare in the study area. Decreasing agro-ecology is creating problem in the crops production by increasing production cost, over use of agricultural inputs.

It is clearly found that there is a mentionable change in the agricultural production during 20-50 years like crops production rate per acre, multiple crops production, production materials, people's awareness and other agricultural activities in the study area.

Mr. Sutradhar gave opinion for the development of agriculture that will help the development of the rural people. These are development of transportation system, supply sufficient tools for training of the farmers; supply the necessary equipments with kids for testing the soil, correlate technology with agriculture, seeds preservation by the farmers themselves. He also mentioned there is a river and cannel in the study area that may be the best source of surface water and fish by dazing. This dazing will reduce the use of ground water and will create agriculture in a friendly environment.

9.4.5 KII-5

Abu Bkhtear Md. Feroj is a lecturer of Accounting of the Bill Chalon Multilateral High School and College at Bilsha of Gurudaspur Upazilla under the district of Natore. He said that at present boro, amon, wheat, maize, jute and in very few cases mustard are produced in the study area. Most of the farmers produce IRR-29. Agriculture is produced by the land owners, lease takers and mortgage taker in the study area. Maize is more profitable than other crops but not produced by all the farmers due to the difference of the quality of soil.

Mr. Feroj mentioned that the nature of agriculture has been changed in different sectors of crops production. In irrigation system, now all the people use shallow machine and mortar with deep tube well and collect ground water. Few years ago doan, basket, and power pump used more and collected water from surface water. At present all are producing HYV boro rice for production more. Few years ago people

produced local crops that were low production rate per acre. Now nobody produce traditional or local crops. Chemical fertilizer is used more that helps more production. This practice was low some years ago due to disinterest of the people and using practice of organic fertilizer. Pesticides use in decreasing labor cost in agricultural production. At present pesticides is not only used for killing insects but also used for diminishing grass in the study area. Pesticides are used for the better quality of rice. People are trying to produce some kinds of crops in their land. On the other hand a large number of non owners of land are producing crops by taking lease in the study area. Very few are producing by taking mortgage.

He said there are some problems in agricultural change and production as well. The high price of agricultural materials is major problem in agricultural production. It increases the cost of agricultural production. High rate of diesel price creates obstacle on production cost. Decline of ground water is a problem and one of the major concerns to the farmers. In summer season it becomes very terrible in the study area. About 20-25 years ago ground water was taken from 20-25 feet deep. At present ground water is taken from 70-80 feet deep. In some cases seeds are not found in best quality from open market or even at packet. The quality of fertilizer has been decreased. As a result fertilizer is used more that increases the production cost. Pesticides use is killing many useful insects and decreasing soil quality. Farmers become hopeless during the time of crops cutting due to low price of agricultural production. Those who have no arable lands they are producing more by taking lease and their benefit is not higher than the land owner. River and cannel become dry in summer season.

Mr. Feroj mentioned some prospects in the agricultural change. In the irrigation system there is an opportunity to use surface water from the river and cannel for few months. This is possible due to the rubber drum. On the other hand electric mortar is using in the study are that reduce production cost. People are awaking to collect and preserve quality seeds in the study area and using HYV production increases more production per acre. Multiple crops production is increasing day by day that help to profit more.

Communications opportunities are creating in the study area that reduces the carrying cost of the agricultural production. A bridge is creating a nice opportunity in the chalon beel area. The work of establishing bridge is almost at the ending stage. The demand of straw is another source of money from agriculture. About 3000 Tk. per acre extra comes from rice production. A temporary business system is developing on the basis of straw. This business is continuing during rainy season.

He said that there is a significant relationship between agricultural change and development in the study area. Almost all of the people depend on agriculture in the study area. So, if agricultural production is more then their lifestyle is better and if production is low then their lifestyle is low at that time. Besides these there is a remarkable change found in the development of occupation, education, sanitation, housing pattern that imply the reflection and effects of agricultural change.

Mr. Feroj said that the relationship is found between agriculture and climate or environment. Fog and cold weather create problems during plantation. Hailstorm or storm creates problem and risk for the agricultural production and change as well. Rain is another environmental problem that creates problem in the agricultural production. He said that natural calamities have been reduced from unknown reason comparatively from the previous time. *Kal Boishakhi Jhor* creates problems in some years during crops cutting and preservation. In this time seeds preservation become very risky.

He mentioned that agro-ecology system has been changed and decreased in the study area due to over use of chemical fertilizer, pesticides and ground water. As a result soil quality is decreasing day by day. Decreasing agro-ecology is creating problem in the crops production by using fertilizer, pesticides more needs.

It is found that there is a change in the agricultural production during 50 years in many areas like crops production rate per acre, multiple crops production, production materials, people's awareness and increasing attachment in agricultural activities. Use of arable land has been increased in the study area.

Mr. Feroj gave opinion for the development of agriculture that will help the development of the rural people. He mentioned widely electric mortar should be used

and production cost will be reduced that helps the people fore production more Increase of subsidy in the agricultural sectors especially in diesel, ensure easy loan system for the farmers, arrange the training for the farmers how to use chemical fertilizer and pesticides, regularly soil test. There is a river and cannel in the study area that may be the best source of surface water and fish by dazing and this dazing will reduce the use of ground water.

9.5 Summary

In the study area, most of the people depend on agricultural activities and are producing from generation to generation. More production and production prices help to the reflection of happiness and unhappiness. There is a remarkable change found in agriculture like multiple crops production, water, seeds, fertilizer and pesticides. Besides these, changes are also found in harvesting, plough and labor force and there are some problems that are hindering in the production process, and some prospects are found in the agricultural change that helps the rural people for the development of them. So, it is clear that there is a significant role of the problems and prospects of agricultural change on efforts to development in the study area as well as rural areas of Bangladesh.

From the case studies and KII, we find that agricultural change is endowed in the study area. Respondents' strength and awareness helps to change the agricultural production. Their agricultural dependency not yet create problem rather they are happy for their more production, that is the result of agricultural change in terms of traditional to modern production process. Agricultural change effects on income, education, property, housing pattern, occupation, savings opportunity that also reflects on respondents' lifestyle and their activities. Rural people try to develop themselves by dint of agriculture.

CONCLUSION

Agriculture is the main source of livelihood that bears the special attention from generation to generation in the study area. Once upon a time the study area was under the water over the year and agricultural activities started in a very small scale by traditional ways. People tried to develop agricultural production for their survival due to no other opportunities were present that time and till today they are trying to improve their production process for their betterment of lifestyle, and fulfillment of domestic needs including basic needs. The arable land is fertile in the study area in comparison to many other areas in the country so that nobody lost their opportunities in their lifetime through agricultural change endowed after the innovation of HYV production that also increased the utility of arable land. Agricultural change is a process that adapt from traditional to modern production with passing many years by the experience of the respondents as well as the rural people that increases production and their development. This change is clear from the selection of seeds to preservation of crops. Agricultural change is the results of agricultural modernization and the demand of rural people. In the changing process of agriculture, people faced so many problems and prospects that reflect their socio-economic indicators as well as sociological issues in their lifetime. On the basis of the objectives of the study, relevant literature reviewed to find out the research gap and follow the scientific research method to collect and analyze data in a meaningful way.

Most of the respondents are within 50 years old and Muslim in the study area. The average household's members of the respondents are 6 in number. 95.85 percent respondents are the head of their households. There are ten primary occupational classes and some one have secondary occupation. Joint or extend family has been broken and rural type of nuclear family is being formed in the study area. Respondents gave their opinion on problems of taking occupation of which financial crisis, lack of opportunities, problems of communication, lack of consciousness and lack of training are mentionable. They also gave their opinion on

prospects of taking occupation like high yielding and modern varieties crops production, multiple crops production, and reformation of road, arrangement of training and financial solvency in the study area. Primary and secondary education rate is high among the respondents and education rate is high among the children than the respondents. Tendency of taking education by the children has been increased and few drops out cases are found in the study area. Most of the respondents (39.24%) take their primary education. 06.04 percent respondents are illiterate. Income of the respondents has been increased in the study area. The average income of the respondents is 76,925.00 taka per year. The average expenditure of the respondents is 58,660.00 taka per year. The average savings of the respondents is 18,245.00 taka per year.

The average housing land is 5.32 decimal and arable land is 2.37 acre of the respondents. 09.06 Percent respondents are landless-2 (see table no.22), 35.47 percent respondents are landless-3 (see table no. 22), and 55.47 percent respondents are landowner in the study area. Land ownership pattern is highly unequal in the study area where 09.06 percent respondents have no arable land. Some problems like scarcity of land, high price, land base complexity and more competition are found in achieving land. Besides these problems, prospects like increasing agricultural production, increasing income that comes from multiple crops productions. Land ownership is made by inherit, purchase, marital and gift mostly, and there are some social classes observed on the basis of land ownership of which 55.67 percent is land owner and the rest of them are landless but no landless-1 class (see table no. 22) in the study area. Mortgage system and lease system are practiced in different terms and conditions. The main problems of mortgage system are high rate in amount, handover to another incase of high rate in amount and taking mortgage keeping lease. The problems of lease system are also found in the study area that is more competition, less certainty, keeping one to another and conflict between children and parents. In some cases problems of land ownership creates obstacle in agricultural development. These problems are land based complexity,

litigation and quarrel. The nature of land tenure system has been changed in terms of land ownership. Many non-owners are producing through the ownership of mortgage or lease system. Housing pattern has been developed in the study area in terms of their father and grand father's hosing pattern. Most of the respondents (58.11%) respondents live in the house which made of clay with tin. Most of the respondent's father (38.49%) lived in the house which made of clay with straw and most of the respondent's grandfather (76.98%) lived in the house which made of clay with straw. Some of the respondents live in brick with roof where their father or grandfather had no such type of house. These socio-economic indicators imply that the developmental opportunities have been created and are creating new opportunities day by day in the study area.

Agricultural change is a desire of the respondents that is found in the study area. Many respondents are able to purchase arable land that changes the ownership of land. A remarkable change is found in agricultural production from 20-50 years ago. Once upon a time most of the respondents produce traditional crops moreover now all are producing high yielding varieties and modern varieties that helps to more production and profit. Net expenditure has been increased but most of the cases net profit has also been increased though it depends on climate. There is a noteworthy change in cultivation method. Many agricultural tools are easily managed and some are managed with troubles. Most of the respondents fulfill their domestic food demand by their production and sale surplus production. Irrigation system has been developed but decline of ground water is creating problem in crops production. There are some problems in irrigation system of which decline of ground water, dry river, electricity crisis, bore damage, machine damage, increase diesel price and draught are mentionable. Some prospects like rubber Drum Bridge, electric mortar connection, availability of parts, availability of machine and river dazing are found in the study area. In irrigation system 47.92 percent respondents have their own ownership and 52.08 percent have no ownership who hire from others by money per acre. At present 72.84 percent respondents use deep tube well

with shallow machine and 16.98 percent respondents use deep tube well with electric mortar that were absolutely absent 20-50 years ago. Declining ground water is still a major threat in agricultural production and rural development as well.

Packet seeds comparatively better but in some cases creates problems in plant growing. So, there are some problems like less seedling of packet seeds, seeds preservation in rain and species problem of open seeds; and prospects like government initiatives, packet system and careful on climate are found in the seeds. The respondents gave their opinion regarding the problems of seeds of which less seedling of packet seeds is 52.83 percent, seeds preservation in rain is 91.70 percent and species problem of open seeds is 43.40 percent. There are some prospects of seeds of which government initiatives is 65.28 percent, packet system is 47.17 percent and careful on climate is 84.53 percent.

Dependency on chemical fertilizer has been increased that is decreasing soil fertility despite more production. There are some problems of using chemical fertilizer that are using more needs day by day, decreasing soil fertility, increasing demand each year, qualities are decreasing, wants of getting timely and lack of training. There are also some prospects of using chemical fertilizer that are no crisis, getting in time; preservation is possible with multiple crops production. All the respondents use chemical fertilizer and pesticides in their production process. The using ration of Urea, TSP and Potash is almost 3:2:1.

Use of pesticides has been seriously increased that is creating problems on health and environment, though there is no alternative way without using pesticides. As a result some problems and prospects are found of using pesticides. The problems are wants of qualities, ignorance of using, vomiting, feel dizzy, over swatting, bound to use each year and decreasing worth arm. The prospects of using pesticides are all are using, help representative company agents and compulsory use.

Changing pattern of agricultural production is very clear in many issues from the preparation of land for production to crops crushing. There are some problems like decreasing soil fertility, decreasing agro-ecology system, lack of awareness, lack of

quality seeds, lack of quality fertilizer, decline ground water level, load shedding, financial crisis and lack of training in more agricultural production but some prospects like respondent's strength, high yielding varieties, increasing production price, development of communication system, quality seeds, educated are involving, positive role of media and government initiatives are also found in agricultural production. Agricultural production most of the time depends on climate, respondents faces many risks of agricultural production like fog, storm, heavy rain, hailstorm, draught, insects, decline ground water are mentionable. Most of the respondents (36.60%) cultivate their own land. 20-50 years ago amon, aus wheat produced more. At present all the respondents produce HYV boro. The average expenditure of boro production is 21,245.00-22,255.00 taka per acre and net benefit is almost 27,000.00- 32,000.00 per acre. The average expenditure of wheat production is 9,147.00-9,432.00 taka per acre and net benefit is 22,353.00-31,068.00 taka per acre. The average expenditure of maize production is 16,237.00-16,367.00 taka per acre and net benefit is 61,763.00-81,133.00 taka per acre. The average expenditure of jute production is 5,530.00-5,720.00 taka per acre and net benefit is 24,470.00-48,280.00 taka per acre. The average expenditure of amon production is 4,800.00-5,040.00 taka per acre and net benefit is 8,850.00-10,560.00 taka per acre. 20-50 years ago 100.00 used plough and tractor but at present 01.51 percent use plough and 98.49 percent use power tiller for their agricultural production.

All are depending on agriculture. So steps should be taken for the development of agriculture that will help the respondents and country people as well. The major opinion for the development of agriculture are decreasing the price of agricultural tools, increase the price of agricultural production, real price during crops cutting, development of the qualities of seeds, development of the qualities of fertilizer, mortar connection and electricity supply, active response of agriculture officer, regular soil test, awareness building to the farmers and giving priority to the agriculture. Decreasing soil fertility and agro-ecology system, lack of respondent's

awareness, lack of quality seeds and fertilizer, declining ground water level, and lack of training are obstacles for production more. Respondent' strength, high yielding varieties, increasing crops price, development of communication system, involving educated persons, positive role of media and government initiatives are helpful for production more in the study area. Decreasing the price of agricultural tools, increasing the price of agricultural production, real price during crop cutting, ensure quality seeds and mortar connection and electricity supply, active response of the agriculture officer, regular soil test, awareness building of the farmer and priority to the agriculture effect on the expansion of agriculture that helps the development of the rural people. 38.11 percent respondents said that their social status has been increased due to agricultural production and change, 50.95 percent respondents said that their social status is till same due to no any amazing change in their life and 10.94 percent respondents said that their social status has been decreased due to agricultural production.

Agro-ecology system plays significant role in agricultural production in many ways like control of soil fertility; creation of balance among insects, birds and other useful animal; and more production as well. Once upon a time it was a great opportunity of agro-ecology in favor of agricultural production. This scenario is not found at present in the study area because of soil quality has been decreased; useful insects and animal likewise earth-worm, snail, cockle and birds have been decreased due to over use of fertilizer and pesticides etc. Multiple crops production is found in the study area that helps to improve the soil fertility and agro-ecology as well. Impact of irrigation on agro-ecology is very negative in the study area for declining of ground water level that creates problem in high production and agricultural development as well. Finally it is found that agro-ecological system has been degraded in the study area.

The impact of climate on agricultural production is clear in many ways especially by natural calamities is mentionable. Impacts of climate on crops production in seeds sowing, plant raise, harrowing, crops crushing etc. are found most. It has

negative impact on crops production by low production, re-plant raise, preservation etc. Agricultural production expenditure is increased by agricultural inputs and equipments like use of more plant, use of more labor, extra hard work, use of more fertilizer, use of more diesel, decline ground water and early cutting of crops. It also impact on crops marketing that make problems to the respondents. Storm/hailstorm, rain, flood and dense fog are the obstacle for crops marketing. Climate has significant impact on food habits in the study area due to depend on the nature and kinds of crops production. Climate change creates the opportunities of multiple crop production that is playing important role in increasing labor demand and price which help the improvement of laborer's livelihood and rural development as well. Overall some natural calamities like draught, flood, storm, cold or fog, decline ground water and hailstorm lost much more money for the respondents during 20-50 years and these problems are still facing the respondents in many ways that creates obstacle in agricultural production but are trying to avoid the problems.

The 6.42 percent respondents said that soil qualities of the arable land have been increased and 93.58 percent respondents said that soil qualities of the arable land have been decreased. They said that at present many useful insects and birds or animals have been decreased due to many reasons like over use of chemical fertilizer (92.08%), over use of pesticides (95.47%), hunting (91.70%), decreasing insects (96.98%), wants of foods (92.08%), wants of nest (87.17%), land is dried quickly (56.98%) and decreasing fish (92.45) in the study area. The respondents gave their opinion on fertility in terms of same crop production of which fertility is decreased is 89.43 percent, fertility did not decrease is 8.68 percent and unknown to the respondents is 1.89 percent. They also gave their opinion on the impact of irrigation on agro-ecology that are decline ground water is 98.87 percent, increased dryness of soil is 80.75 percent, decreased clay is 60.00 percent, decreased soil fertility is 61.89 percent and decreased preservation ability is 81.13 percent.

The respondents gave their opinion on the impact of climate on crops production in different stages like the time of seeds sowing, plant raise, use of fertilizer,

harrowing, crops cutting and crops crushing. They also mentioned the negative impact of climate on crops production that are low production, re-plant raise, a grain of paddy containing no rice, marketing problems and preservation problems during the time of harvesting. All the respondents said that impact of climate on food habits is clear in the study area. There is an impact of climate on works/labor that are creation of working areas is 76.98 percent, increase of labor price is 95.09 percent and increase of labor demand is 88.30 percent. They calculate an estimate loss for climate during 20-50 years in the study area. The average loss for draught is 73,660.00 taka. The average loss for flood is 75,170.00 taka. The average loss for storm is 76,755.00 taka. The average loss for cold or fog is 71,528.00 taka. The average loss for decline ground water is 76,604.00 taka and the average loss for hailstorm is 77,679.00 taka.

Agricultural change means the change of the stages of production post production and pattern of cropping system through water, seeds, fertilizer and pesticides including multiple crops production that reflects on more enhancing agricultural production. In the study area, agricultural change paved the way to develop the rural people. Problems create obstacles for the smooth expansion of agriculture but people remove the hindering behind their development on the basis of agriculture by taking new technologies and ideas regarding more agricultural production. Rural people desire to develop their livelihood and, agriculture is only way to carry out their demand through accomplishing income, saving, occupation for themselves and children, education for their children, evolving their homestead and creation of new opportunities for themselves and their children as well. So, it is clear that socio-economic condition of the rural people has been developed, pattern of land ownership has been changed in nature, the nature of agricultural production has been changed, agro-ecological system has been degraded and impact of climate on agriculture is found in the study area. They are very much optimist by identifying their prospects of agricultural change that will contribute production more and assist their developmental efforts in the rural areas of Bangladesh.

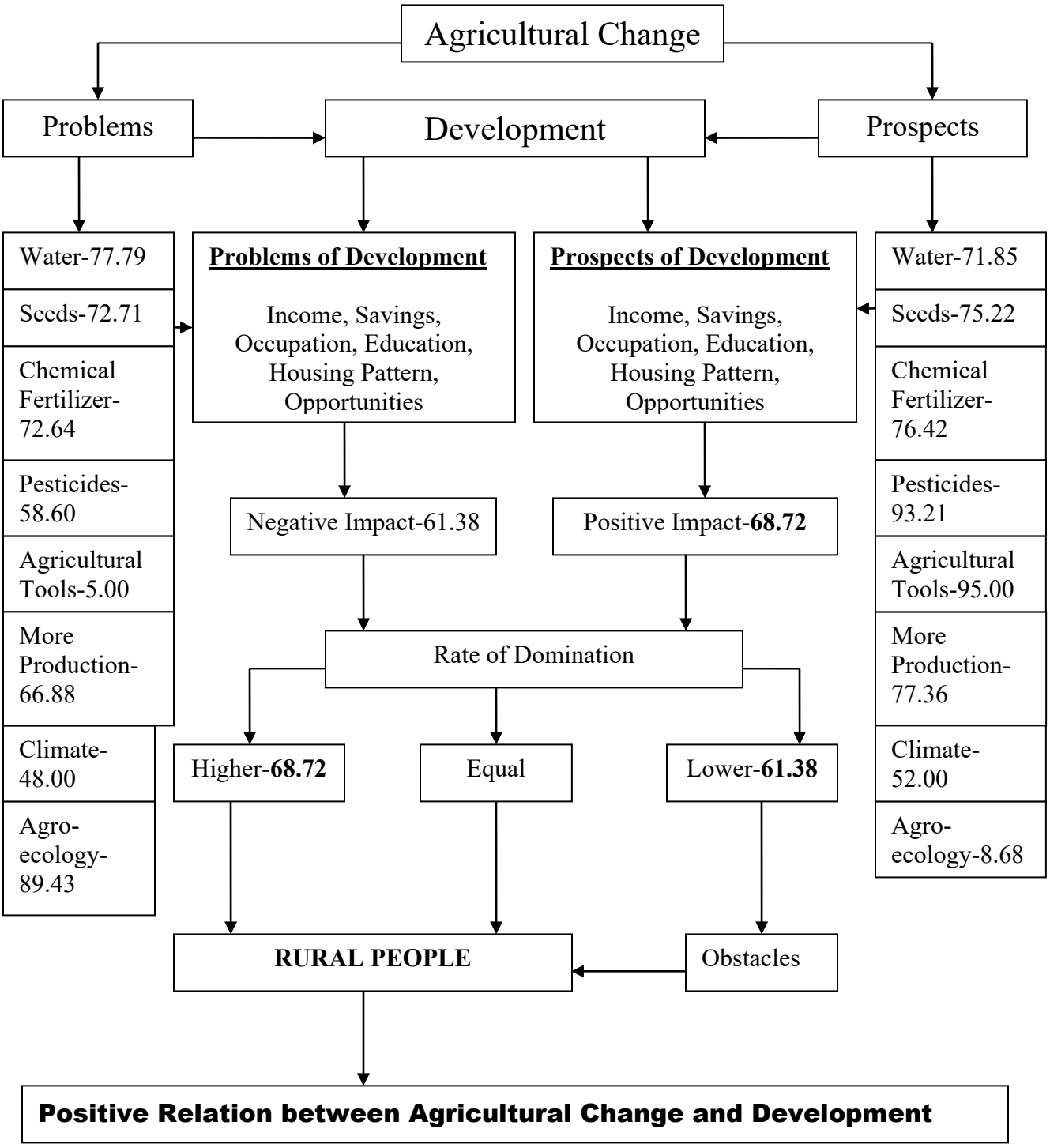


Fig-13: Results of analytical framework

The negative impact of the problems of agricultural change is 61.38 percent which impact on the problems of development. The positive impact of the prospects agricultural change is 68.72 percent which also impact on the prospects of development. The rate of domination is 68.72 percent and 61.38 percent creates

obstacle for the development of the rural people. But this study found that there is a positive relation between the agricultural change and development in the rural areas of Bangladesh.

From the above discussion, some steps should be taken for the development of the agricultural production that will help to increase more production and food security for themselves and country people as well.

- ◊ Price of agricultural production materials should be reduced.
- ◊ Price of agricultural production should be increased.
- ◊ Ensure the quality of seeds, fertilizer and pesticides.
- ◊ Increase subsidy for agricultural production.
- ◊ Ensure easy and easily payable credit for the farmers.
- ◊ Dazing the river and cannel for ensuring surface water.
- ◊ Adequate supply and expansion of electricity.
- ◊ Expansion of the use of electric mortar.
- ◊ Arrange training of the respondents for agricultural production.
- ◊ Ensure soil quality by testing the arable land.
- ◊ Infrastructural development in the study area.
- ◊ Agricultural research should be conducted regularly for investigation of socio-economic condition and crops production as well.

These initiatives may play significant role for the improvement of agricultural production that will help the developmental efforts to the rural people Bangladesh.

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APPENDIX-I

গবেষণামূলক প্রশ্নপত্র

পাড়াঃ.....

☐ভূমিমালিক ☐ভূমিহীন

১. ব্যক্তিগত তথ্যাবলী

১.১ নাম:.....

১.২ বয়স:.....

১.৩ ধর্ম:.....

১.৪ বর্ণ:.....

১.৫ বৈবাহিক অবস্থা:.....

১.৬ পেশা:

	মূখ্য পেশা	গৌণ পেশা
উত্তরদাতা		
উত্তরদাতার পিতা		
উত্তরদাতার দাদা		

১.৭ পেশা গ্রহণে সমস্যা কি?.....

১.৮ পেশা গ্রহণে সম্ভাবনা কি?.....

১.৯ শিক্ষা:

	শিক্ষার ধরন
উত্তরদাতা	
উত্তরদাতার পিতা	
উত্তরদাতার দাদা	

১.১০ শিক্ষা গ্রহণে সমস্যা কি?.....

১.১১ শিক্ষা গ্রহণে সম্ভাবনা কি?.....

১১২ খানার সদস্য সংখ্যা:.....

১.১৩ খানা প্রধান ঃ .....

১.১৪ খানার সদস্যদের তথ্যাবলী:

ক্রমিক নং	নাম	বয়স	পেশা	শিক্ষা	খানা প্রধানের সঙ্গে সম্পর্ক
০১					
০২					
০৩					
০৪					
০৫					
০৬					
০৭					
০৮					
০৯					
১০					

১.১৫ সন্তানের শিক্ষা গ্রহণে কোন সমস্যা হয় কিনা? .....

১.১৬ কোন সন্তান লেখাপড়া বন্ধ করেছে কিনা? .....

১.১৭ খানা/ পরিবারের ধরন ঃ ☐ একক ☐ যৌথ

১.১৮ বাসস্থানের ধরন ও সংখ্যা ঃ

	মাটি ও ছন	মাটি ও টালি	মাটি ও টিন	বেড়া ও ছন	বেড়া ও টিন	ইট ও টিন	ইট ও ছাদ	অন্যান্য
উত্তরদাতা								
উত্তরদাতার পিতা								
উত্তরদাতার দাদা								

২. অর্থনৈতিক তথ্যাবলী

২.১ বাৎসরিক আয় কত?

	বাৎসরিক আয় (টাকা)
উত্তরদাতা	
উত্তরদাতার পিতা	
উত্তরদাতার দাদা	

২.২ আপনার আয়ের উৎস কি?

আয়ের উৎস	টাকা
কৃষি	
চাকুরী	
ব্যবসা	
মজুরী	
মৎস্য শিকার	
অন্যান্য (নির্দিষ্ট করুন)	

২.৩ আপনার বাৎসরিক ব্যয় কত এবং ব্যয়ের খাতসমূহ কি?.....

২.৪ আপনার বাৎসরিক সঞ্চয় কত এবং সঞ্চয়কৃত টাকা কি কাজে ব্যবহার করেন?.....

২.৫ আয় বৃদ্ধিতে সমস্যা কি?.....

২.৬ আয় বৃদ্ধিতে সম্ভাবনা কি?.....

২.৭ আপনার জমির পরিমাণ কত?

জমির ধরন	পরিমাণ (শতাংশ/একর)
বসত বাড়ি	
চাষযোগ্য জমি	
পতিত জমি	
পুকুর	
অন্যান্য (**নির্দিষ্ট করুন**)	

২.৮ সম্পত্তি গ্রহণে সমস্যা কি?.....

২.৯ সম্পত্তি গ্রহণে সম্ভাবনা কি?.....

৩.ভূমি মালিকানা ব্যবস্থা

৩.১ জমির মালিকানার ধরন

মালিকানার ধরন	বসতবাড়ি (শতাংশ)	চাষযোগ্য জমির পরিমাণ (একর)
উত্তরাধিকার সূত্রে		
ক্রয় সূত্রে		
বৈবাহিক সূত্রে		
দান সূত্রে		
অন্যান্য (**নির্দিষ্ট করুন**)		

৩.২ মালিকানায় কোন সমস্যা বা জটিলতা সৃষ্টি হয় কিনা? .....

৩.৩ বন্ধকী ব্যবস্থার ধরন কেমন?.....

৩.৪ বন্ধকী ব্যবস্থাতে কোন সমস্যা হয় কিনা? .....

৩.৫ লিজ ব্যবস্থার ধরন কেমন?.....

৩.৬ লিজ ব্যবস্থাতে কোন সমস্যা হয় কিনা? .....

৩.৭ কৃষি উন্নয়নে ভূমি মালিকানা ব্যবস্থার সমস্যা কি ও কেন?.....

৪. কৃষি ও কৃষি পরিবর্তন সম্পর্কিত তথ্যাবলী

৪.১ আপনি কত একর জমি চাষ করেন?

মালিকানা	চাষের ধরন	জমির পরিমাণ (একর)
নিজের জমি	নিজ	
অন্যের জমি	বর্গা চাষ	
	ভাগ চাষ	
	বন্ধকী/খায়খালাসী	
	বাৎসরিক লিজ/নির্ধারিত খাজনা	
	অন্যান্য (নির্দিষ্ট করুন)	
অনুপস্থিত ভূস্বামী		

৪.২ জমি চাষে মালিকানার কোন পরিবর্তন এসেছে কিনা?

৪.৩ আপনি জমিতে আগে (২০-৫০ বছর) কি কি ফসল চাষ করতেন?

ফসলের নাম	জাত	একর প্রতি উৎপাদনের পরিমাণ (মণ)	একর প্রতি উৎপাদন খরচ (টাকা)	একর প্রতি আয় (টাকা)	একর প্রতি লাভ (টাকা)
আমন ধান					
আউশ ধান					
বোরো ধান					
গম					
যব					
সরিষা					
ডাল					
তিল					
পাট					
অন্যান্য (নির্দিষ্ট করুন)					

৪.৪ বর্তমানে কি কি ফসল চাষ করেন?

ফসলের নাম	জাত	একর প্রতি উৎপাদনের পরিমাণ (মণ)	একর প্রতি উৎপাদন খরচ (টাকা)	একর প্রতি আয় (টাকা)	একর প্রতি লাভ (টাকা)
আমন ধান					
আউশ ধান					
বোরো ধান					
গম					
যব					
সরিষা					
রাই					
তিল					
পাট					

অন্যান্য (নির্দিষ্ট করুন)					

৪.৫ বর্তমানে কি কি জাতের ধান চাষ করেন এবং উৎপাদন কেমন?

জাতের নাম		একর প্রতি উৎপাদনের পরিমাণ (মণ)	একর প্রতি উৎপাদন খরচ (টাকা)	একর প্রতি উৎপাদন ব্যয় (টাকা)	একর প্রতি লাভ (টাকা)
উচচ ফলনশীল					
স্থানীয় জাত					

৪.৬ আপনি জমিতে কি সার ও কি পরিমাণে ব্যবহার করেন?

সারের নাম		একর প্রতি পরিমাণ (আগে)	একর প্রতি পরিমাণ (বর্তমানে)
জৈব			
অজৈব/রাসায়নিক	ইউরিয়া		
	টিএসপি/ফসফেট		
	পটাশ		
	এমপি		
	জিংক/দস্তা		
অন্যান্য (নির্দিষ্ট করুন)			

৪.৭ সেচ পদ্ধতি কেমন?

	মালিকানার ধরন	আগের (২০-৫০ বৎসর)	বর্তমানে
মুক্ত জলাশয় + শ্যালো মেশিন			
নদীর পানি + শ্যালো মেশিন			
মুক্ত জলাশয় + দোন			
নদীর পানি + সেউতি			
গভীর নলকূপ + শ্যালো মেশিন			
অন্যান্য (নির্দিষ্ট করুন)			

৪.৮ সেচ ব্যবস্থার সমস্যা কি এবং কেন?.....

৪.৯ সেচ ব্যবস্থার সম্ভাবনা কি এবং কেন?.....

৪.১০ বীজের সমস্যা কি এবং কেন?.....

৪.১১ বীজের সম্ভাবনা কি এবং কেন?.....

৪.১২ রাসায়নিক সার ব্যবহারের সমস্যা কি এবং কেন?.....

৪.১৩ রাসায়নিক সার ব্যবহারের সম্ভাবনা কি এবং কেন?.....

৪.১৪ জৈবসার ব্যবহার করেন কিনা?.....

৪.১৫ কীটনাশক ব্যবহার করেন কিনা? ☐ হ্যাঁ ☐ না

৪.১৬ হ্যাঁ হলে কেন ও কি পরিমাণে?

কীটনাশকের নাম	একর প্রতি পরিমাণ

৪.১৭ কীটনাশক ব্যবহারের সমস্যা কি এবং কেন?.....

৪.১৮ কীটনাশক ব্যবহারের সম্ভাবনা কি এবং কেন?.....

৪.১৯ কিভাবে জমি চাষ করেন?

চাষ পদ্ধতি	আগে (২০-৫০ বৎসর)	বর্তমানে
লাঙ্গল		
ট্রাকটর		
পাওয়ার ট্রিলার		

৪.২০ ফসলের সময় নির্ধারণ ও সাহায্যকারী

কাজের ধরন	সময়	যন্ত্র ব্যবহার	
		আগে (২০-৫০ বৎসর)	বর্তমানে
বীজ বপন			
চারা রোপন			
সার প্রয়োগ			
ডনড়ানী			
ফসল কর্তন			
ফসল মাড়াই			

৪.২১ বপন থেকে মাড়াই পর্যন্ত কোন পরিবর্তন এসেছে কিনা? ☐ হ্যাঁ ☐ না

৪.২২ কেমন/কেন?.....

৪.২৩ আপনি মোট কত মণ ধান পেয়ে থাকেন?..... মণ

৪.২৪ আপনার পরিবারের খোড়াকীর জন্য মোট কত মণ ধান প্রয়োজন হয়?.....মণ

৪.২৫ অবশিষ্ট ধান কি করেন এবং কেন?.....

৪.২৬ ধান সংরক্ষণের উপায় কি?.....

৪.২৭ কৃষিতে ব্যবহৃত উপকরণের নাম.....

৪.২৮ কৃষিতে প্রতি একর ব্যয় চিত্র

ব্যয়ের খাতসমূহ	একর প্রতি ব্যয় (টাকা)
জমি চাষ	
বীজ	
সার	
সেচ (ইঞ্জিন ভাড়া + ডিজেল)	
নিড়ানী	
কীটনাশক	
মজুরী	
অন্যান্য (নিদির্ষ্ট করুন)	

৪.২৯ কৃষিতে প্রতি একর আয় চিত্র

আয়ের খাতসমূহ	একর প্রতি আয় (টাকা)
ধান	
খর	
অন্যান্য (নির্দিষ্ট করুন)	

৪.৩০ কৃষি উপকরণ প্রাপ্তিতে সমস্যা কি?.....

৪.৩১ কৃষি উপকরণ কিভাবে সহজলভ্য করা সম্ভব?.....

৪.৩২ কৃষি উন্নয়নে আপনার মতামত কি?.....

৪.৩৩ অধিক পরিমানে শস্য উৎপাদনে সমস্যা কি?.....

৪.৩৪ অধিক পরিমানে শস্য উৎপাদনে সম্ভাবনা কি?.....

৪.৩৫ কৃষির ঝুঁকিসমূহ কি এবং.কেন?.....

৪.৩৬ এ সকল ঝুঁকি কিভাবে মোকাবেলা করেন?.....

৪.৩৭ এ সকল ঝুঁকি থেকে মুক্তির উপায় কি?.....

৪.৩৮ কৃষি কাজ করায় সামাজিক মর্যাদা হ্রাস-বৃদ্ধি পেয়েছে কিনা? .....

৫. কৃষি প্রতিবেশ

৫.১ আপনি কি মনে করেন মাটির গুণাগুণ আগের চেয়ে হ্রাস-বৃদ্ধি পেয়েছে? .....

৫.২ জমির মাটি পরীক্ষা করেন কিনা? .....

৫.৩ জমির উপকারী প্রাণী/জীব কি?.....

৫.৪ জমির উপকারী প্রাণী/জীব আগের চেয়ে হ্রাস-বৃদ্ধি পেয়েছে কিনা? .....

৫.৫ শস্য ক্ষেতে পাখি বসার ক্ষেত্রে আগের চেয়ে হ্রাস-বৃদ্ধি পেয়েছে কিনা? .....

৫.৬ জমি থেকে পানি যাবার সময় পাখি সমাগমে হ্রাস-বৃদ্ধি পেয়েছে কিনা? .....

৫.৭ একই ধরনের শস্য উৎপাদনে মাটির উর্বরাশক্তি হ্রাস-বৃদ্ধি হয় কিনা? .....

৫.৮ কৃষি প্রতিবেশে সেচ ব্যবস্থার প্রভাব কি?.....

৬. জলবায়ুগত প্রভাব

৬.১ শস্য উৎপাদনে জলবায়ুগত প্রভাব কিভাবে লক্ষ্য করা যায়

ক্ষেত্রসমূহ	প্রভাব
বীজ বপন	
চারা রোপন	
সার প্রয়োগ	
ডনড়ানী	
ফসল কর্তন	
ফসল মাড়াই	
অন্যান্য (নির্দিষ্ট করুন)	

৬.২ শস্য উৎপাদনে জলবায়ুগত ক্ষতিকর প্রভাব লক্ষ্য করা যায় কিনা? .....

৬.৩ শস্য উৎপাদন ব্যয়ে জলবায়ুগত প্রভাব লক্ষ্য করা যায় কিনা? .....

৬.৪ শস্য সংরক্ষণে জলবায়ুগত প্রভাব লক্ষ্য করা যায় কিনা? .....

৬.৫ শস্য বাজারজাতকরণে জলবায়ুগত প্রভাব লক্ষ্য করা যায় কিনা?.....

৬.৬ জলবায়ুগত কারণে খাদ্যাভাসে কোন পরিবর্তন হয়েছে কিনা? .....

৬.৭ জলবায়ুগত কারণে কাজ/মজুরীর উপর কোন প্রভাব পড়েছে কিনা? .....

৬.৮ জলবায়ুগত ক্ষতিকর প্রভাব (গত ২০-৫০ বৎসরে)

ক্ষতিকর প্রভাবের ক্ষেত্রসমূহ	ক্ষতির পরিমাণ (টাকা)
খরা	
বন্যা	
ঝড়	
শীত	
ভূগর্ভস্থ পানির স্তর নিচে নেমে যাওয়া	
অন্যান্য (নির্দিষ্ট করুন)	

ধন্যবাদ

QUESTIONNAIRE

Paraঃ.....
☐Landowner ☐Landless

1. Personal Data

1.1 Name:.....

1.2 Age:.....

1.3 Religion:.....

1.4 Cast/Sect:.....

1.5 Marital Status:.....

1.6 Occupation:

	Primary	Secondary
Respondent		
Respondent's Father		
Respondent's Grand Father		

1.7 What is the problem of taking occupation?.....

1.8 What is the prospect of taking occupation?.....

1.9 Education:

	Types of Education
Respondent	
Respondent's Father	

Respondent's Grand Father	

1.10 What is the problem of taking education?.....

1.11 What is the prospects of taking education?.....

1.12 Number of the members of the household:.....

1.13 Head of the household:.....

1.14 Data about the members of the household:

Sl No.	Name	Age	Occupation	Education	Relation with the head of the household
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					

1.15 Have any problems in taking children education?.....

1.16 Have any dropout of your child?.....

1.17 Types of family/Household: ☐ Nuclear ☐ Joint

1.18 Types and number of house:

Owner of the House	Clay +Straw	Clay +Tile	Clay +Tin	Fence +Chon	Fence +Tin	Brick +Tin	Brick +Roof	Others
Respondent								
Respondent's Father								
Respondent's Grand Father								

2. Financial Data

2.1 Yearly income:

	Yearly income (Taka)
Respondent	
Respondent's Father	
Respondent's Grand Father	

2.2 Sources of income:

Sources of income	Taka
Agriculture	
Service	
Business	
Laborer	

Catching Fish	
Others (identify)	

2.3 Yearly expenditure and areas of expenditure:.....

2.4 Yearly savings and the use of savings:.....

2.5 What is the problem of income?.....

2.6 What is the prospect of income?.....

2.7 Amount of land:

Types of Land	Amount (decimal/ acre)
Housing	
Arable	
Pasture	
Pond	
Others (Specify)	

2.8 What is the problem in taking land?.....

2.9 What is the prospect in taking land?.....

3. Land Tenure System

3.1 Types of ownership:

Types of Ownership	Housing (Decimal)	Arable Land (acre)
Inherit		
Purchase		
Marital		
Gift		
Others (Specify)		

3.2 Have any problem or complexity in ownership?.....

3.3 What is the type of mortgage system?.....

3.4 Have any problem in mortgage system?.....

3.5 What is the type of lease system?.....

3.6 Have any problem in lease system?.....

3.7 What is the problem of land ownership in agricultural development and how?.....

4. Agriculture and Agricultural Change Related Data

4.1 How much land you cultivate?

Ownership	Types of Cultivation	Amount of Land
Own Land	Own	
Another's Land	Borga	
	Vagchash	

	Mortgage	
	Yearly Lease	
	Others (Specify)	
Absent Landlord		

4.2 Have any change on ownership in cultivation?.....

4.5 Before 20-50 years ago in which crops you produced?.....

Crops	**Sepsis**	**Production per acre (mound)**	**Expenditure per acre (mound)**	**Income per acre (taka)**	**Profit per acre (taka)**
Amon					
Aush					
Boro					
Wheat					
Barley					
Mustard					
Dal					
Til					
Jute					
Others (Specify)					

4.6 At present in which crops you cultivate?

Crops	**Sepsis**	**Production per acre (mound)**	**Expenditure per acre (mound)**	**Income per acre (taka)**	**Profit per acre (taka)**
Amon					
Aush					
Boro					
Wheat					
Barley					
Mustard					
Rai					
Til					
Jute					
Others (Specify)					

4.7 In which sepsis of rice you cultivate at present?

Sepsis		**Production per acre (mound)**	**Expenditure per acre (mound)**	**Production value per acre (taka)**	**Profit per acre (taka)**
HYV					
Local					

4.8 Use of chemical fertilizer:

Sepsis	**Production per acre (mound)**	**Expenditure per acre (mound)**

Organic			
Inorganic/Chemical	Urea		
	TSP/Phosphate		
	Potash		
	MP		
	Zink		
Others (Specify)			

Irrigation system:

Types of Irrigation	Types of Ownership	Before (20-50 years)	At present
Open water+Shalow Machine			
River water+Shalow Machine			
Open water+ Doan			
River water+Shewti			
Deep tube well+ Shalow Machine			
Others (Specify)			

4.9 What is the problem of irrigation and why?.....

4.10 What is the prospect of irrigation and why?.....

4.11 What is the problem of seeds and why?.....

4.12 What is the prospect of seeds and why?.....

4.13 What is the problem of using chemical fertilizer and why?.....

4.14 What is the prospect of using chemical fertilizer and why?.....

4.15 Do you use organic fertilizer?.....

4.16 Do you use pesticides? ☐ Yes ☐ No

4.17 If yes then why and how much?

Name of the Pesticides	Amount per acre

4.18 What is the problem of using pesticides and why?.....

4.19 What is the prospect of using Pesticides and why?.....

4.20 How do you cultivate the land?

Methods of Cultivation	Before (20-50 years)	At Present
Plough		
Tractor		
Power tiller		

4.21 Time and helping hand of crops

Types of Works	Time	Use of Machine	
		Before (20-50 years)	At Present
Sow Seeds			
Plant Sowing			

Use of Fertilizer			
Weeding			
Crops Cutting			
Crops Crushing			

4.22 Have any change found from seeds sowing to crops crushing? ☐ Yes ☐ No

4.23 How/Why?.....

4.24 How much rice you have gotten?..... mound

4.25 How much rice are needed for your family as food?..... mound

4.26 What did you do of the rest rice and why?.....

4.27 What is the means of preservation of rice?.....

4.28 Name the using tools in agriculture.....

4.29 Expenditure scenario per acre in agriculture:

Sectors of Expenditure	Expenditure (Taka)
Cultivation	
Seeds	
Fertilizer	
Irrigation (hireling machine + diesel)	
Weeding	
Pesticides	
Laborer	
Others (Specify)	

4.30 Income per acre in agriculture:

Sectors of Income	Income (Taka)
Rice	
Straw	
Others (Specify)	

4.31 What is the problem of taking agricultural tools?.....

4.32 How possible to easy accessible of agricultural tools?.....

4.33 What is your opinion regarding the agricultural development?.....

4.34 What is the problem of much more agricultural production?.....

4.35 What is the prospect of much more agricultural production?.....

4.36 What are the risks of agriculture and why?.....

4.37 How do you mitigate the risks?.....

4.38 What is the way to free from the risks?.....

4.39 Have any social status change for agricultural activities?.....

5. Agro-Ecology

5.1 Do you think any change the qualities of soil either increasing or decreasing?.....

5.1 Do you the soil?.....

5.3 Which is the useful animal of soil?.....

5.4 Have you found any increase or decrease of useful animal in agriculture from before?.....

5.5 Have you found any increase or decrease of birds in sitting in agricultural field?.....

5.6 Have you found any increase or decrease of birds during the water passing time?.....

5.7 Have you found any increase or decrease of soil fertility of crops production?.....

5.8 What is the impact of irrigation on agro-ecology?.....

6. Climatic Impact

6.9 How do you found the climatic impact on crops production?

Sectors	Impact
Sow Seeds	
Plant Sowing	
Using Fertilizer	
Weeding	
Crops Cutting	
Crops Crushing	
Others (Specify)	

6.10 Do you found any harmful in crops production?.....

6.11 Do you found the climatic impact on expenditure of crops production.....

6.12 Do you found the climatic impact on crops preservation?.....

6.13 Do you found the climatic impact of crops marketing?.....

6.14 Have any change found in food habit due to climate?.....

6.15 Have any impact on labor of climate?.....

6.16 Harmful impact of climate (20-50 years):

Harmful Impacts	Amount of Harm (Taka)
Draught	
Flood	
Strom	

Dense Fog	
Decline Ground Water	
Others (Specify)	

Thanks

APPENDIX- II

ফোকাস গ্রুপ ডিসকাশন (এফ.জি.ডি) এর জন্য চেকলিস্ট

১. গ্রামের নামঃ ..... ইউনিয়নঃ.....পোষ্টঃ.....
থানাঃ..... জেলাঃ.....

২. লোক সংখ্যাঃ ক) পুরুষঃ..... খ) মহিলাঃ.....মোটঃ.....

৩. খানার সংখ্যাঃ.....

৪. পাড়ার সংখ্যাঃ.....

৫. শিক্ষার হারঃ.....

৬. কোন কোন পেশার লোক আছেন?.....

৭. আপনার বয়সঃ..... পেশাঃ..... শিক্ষাঃ..... আয়ঃ..... ব্যয়ঃ.....

৮. বর্তমানে প্রধান প্রধান উৎপাদিত শস্যঃ.....

৯. শস্য বপন ও মাড়াই সময়ঃ

শস্যের নাম	বপন সময়	মাড়াই সময়

১০. একরপ্রতি উৎপাদনের পরিমাণঃ

শস্যের নাম	প্রতি একর উৎপাদন (মণ)	প্রতি একর উৎপাদিত পণ্যের ব্যয় (টাকা)	প্রতি একর উৎপাদিত পণ্যের মূল্য (টাকা)

১১. একরপ্রতি ব্যয়ঃ

ব্যয়ের খাতসমূহ	ব্যয়ের পরিমাণ (টাকা)

১২. উৎপাদনে প্রয়োজনীয় উপকরণসমূহ কি?.....

১৩. কৃষি উৎপাদনে আপনাদের কোন প্রশিক্ষণ আছে কিনা? কোথায়/কেন?

১৪. পানির স্তরের বর্তমান অবস্থা কেমন? গত ৫০ বৎসরে পরিবর্তন লক্ষ্য করা যায় কিনা?

১৫. কৃষি প্রতিবেশের বর্তমান অবস্থা কেমন? গত ৫০ বৎসরে পরিবর্তন লক্ষ্য করা যায় কিনা?

১৬. গত ৫০ বৎসরে কৃষি উৎপাদনে জলবায়ুগত ক্ষতিকর প্রভাব কেমন?

জলবায়ুগত ক্ষতির কারণ	একর প্রতি ক্ষতির পরিমাণ (টাকা)

১৭. ভূমি মালিকানা/স্বত্তব্যবস্থার ধরনসমূহ কেমন?.....

১৮. গত ৫০ বৎসরে কৃষি উৎপাদনে পরিবর্তনের ধরন কেমন (সেচ, বীজ, সার, কীটনাশক, চাষ)?.....

১৯. কৃষি উৎপাদনে/ কৃষি পরিবর্তনে সমস্যাসমূহ কি?.....

২০. কৃষি উৎপাদনে/ কৃষি পরিবর্তনে সম্ভাবনাসমূহ কি?.....

২১. কৃষি উন্নয়নে আপনাদের মতামত কি? .....

২২. আপনাদের উন্নয়নে সমস্যা কি?.....

২৩. আপনাদের উন্নয়নে সম্ভাবনা কেমন?.....

ধন্যবাদ

Check List for Focus Group Discussion (FGD)

1. Village: ..... Union:.....Post:.....

Police Station:..... Zilla:.....

2. Population: a) Male:..... b) Female:.....
3. Total households:.....
4. Total para:.....
5. Percentage of education:.....
6. Occupational status:.....
7. Age:.....Occupation:.....Education.....Income:.....Expenditure.....
8. Main producing crops at present:.....
9. Time of crops sowing and crushing:

Name of the Crops	Time of Sowing	Time of Crushing

10. Production per acre:

Name of the Crops	Production per acre (mound)	Expenditure per acre (Tk.)	Production value per acre (Tk.)

10 Expenditure per acre

Sectors of Expenditure	Amount of Expenditure (Tk.)

11. What are the necessary tools of production?.....
12. Have any training of you in agricultural production? Where/Why?.....
13. How the ground water level is? Have any change found in the last 50 years?.....
14. How the agro-ecological condition is? Have any change found in the last 50 years?.....
15. The lost scenario of the impact of climate during the last 50 years?.....

Causes of loss by Climate	Loss Amount per acre (Tk.)

16. How types of land tenure system is?.....
17. How types of agricultural production (irrigation, seeds, fertilizer, pesticides, cultivation) change last 50 years is?.....
18. What are the problems of agricultural production/change?.....
19. What are the prospects of agricultural production/change?.....
20. What is your opinion regarding agricultural development?.....
21. What are the problems of your development?.....
22. How the prospects of development of yours are?.....

Thanks

APPENDIX- III

কি ইনফরমেন্ট ইন্টারভিউ (কে.আই.আই) এর জন্য চেকলিস্ট

১. নাম:.....

২. প্রাতিষ্ঠানিক পরিচিতি:.....

৩. পেশা:.....

৪. বর্তমানে প্রধান প্রধান উৎপাদিত শস্যঃ.....

৫. কৃষি পরিবর্তনের প্রকৃতি সম্পর্কিত ধারণা:.....

৬. কৃষি উৎপাদনে/ কৃষি পরিবর্তনে সমস্যাসমূহ কি?.....

৭. কৃষি উৎপাদনে/ কৃষি পরিবর্তনে সম্ভাবনাসমূহ কি?.....

৮. কৃষি পরিবর্তনের সঙ্গে উন্নয়নের সম্পর্ক কেমন?.....

৯. কৃষির সঙ্গে জলবায়ুর সম্পর্ক কেমন?.....

১০. কৃষি প্রতিবেশের বর্তমান অবস্থা কেমন?.....

১১. গত ৫০ বৎসরে পরিবর্তন লক্ষ্য করা যায় কিনা?.....

১২. কৃষি উন্নয়নে আপনার মতামত কি? .....

ধন্যবাদ

Check List for Key Informant Interview (KII)

1. Name:.....
2. Institutional identity:.....
3. Occupation:.....
4. Main producing crops at present:.....
5. Idea regarding the nature of agricultural production:.....

6. What are the problems of agricultural production/change?.....
7. What are the prospects of agricultural production/change?.....
8. How the relationship between agricultural change and development is?.....
9. How the relationship between agriculture and climate is?.....
10. How the condition if agro-ecology at present is?.....
11. Have any change found last 50 years?.....
12. What is your opinion in the development of agriculture?.....

Thanks