



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas
Package-01
(Dohar Upazila, Nawabganj Upazila, Dhaka and Shibchar Upazila,
Madaripur)

DRAFT SURVEY REPORT
Agricultural Survey
of
Dohar Upazila, Dhaka

February, 2017
Desh Upodesh Ltd. In Association with AIBL & TechSuS

LETTER OF TRANSMITTAL

To,

2nd February, 2017

PD

Preparation of Development Plan for Fourteen Upazilas
Urban Development Directorate (UDD)
82, Segun Bagicha, Dhaka-1000, Bangladesh

Sub: Submission of Dohar Upazila Agricultural Survey Report

Please find attached to this letter, the Agricultural Survey Report of Dohar Upazila of Package-1 of the project 'Preparation of Development Plan for Fourteen Upazilas'. The report has been prepared based on Terms of Reference and the subsequent instructions received from your office time to time.

Hope the current report will meet your requirements.

Thanking you so much.

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EXECUTIVE SUMMARY

Bangladesh is a densely populated country where more than 160 million people living in tiny landmass of about 148,460 sq.km and every year, about 1 percent arable land is going out of agriculture due to rapid urbanization and unplanned growth of rural settlement. This trend of land loss is putting cumulative pressure on agriculture and food security of the country. Government of Bangladesh placed utmost efforts towards halting the process and protecting its valuable agricultural land through planned development of township and rural settlement. This demanded planned use of land and vertical growth of agricultural sector to offer space for other sectoral development. Integrated policies and programs are envisioned to strike balance between development objective of protecting productive land base and addressing the problem of housing in rural- urban areas.

There are various national policies for agriculture sector development; those have implications in the implementation of development programs. Policies are compatible in terms of their avowed goals of increasing productivity and profitability of farming, rapid poverty reduction, and increasing productivity, increasing income and creating employment opportunities. The major thrusts of these policies are largely consistent with the MDGs as well as the strategies and future policy priorities of agriculture and rural development policy matrix suggested in the PRSP.

Government of Bangladesh has undertaken an inclusive development strategy combining the urban and rural areas and the Urban Development Directorate has implementing a project to go for comprehensive planned development of selected upazilas. Dohar upazila under Dhaka district is one of the selected upazilas, where Government of Bangladesh is going to pilot the endeavors. Basic objectives of the current study are to generate agriculture related information necessary for the preparation of the upazila development plan, so as to facilitate the demarcation of agricultural land on the basis of land and soil properties and suitability for crop production; estimate needs of the local people along with challenges and potential of the land resources for HAVCs production and marketing. For the purpose of the study, both primary and secondary, data have been collected through review of relevant reports & literature, PRAs, formal and informal discussions with multiple stakeholders and household survey. Dohar upazila is dominated by medium lowland with a complex mixture of calcareous sands, clayey alluvium soils and in some areas dark grey acidic heavy clays. In the Arial Beel AEZ dark grey acidic and heavy clay soils dominate. Organic matter content generally exceeds two percent in the top and subsoil. Available moisture holding capacity is inherently low and the general fertility level is medium to high. Crop agriculture is the major livelihood option in the upazila. Varieties of crops are grown, among which rice, vegetables, oil crops, pulses and fruits.

Cropping intensity is about 162% and due to dominance of medium low land cropping intensity is comparatively low in summer out of the net cropped 42% area is double cropped. About 39 % cropped area is irrigated and 61 % rainfed. Mechanized cultivation is still limited in land preparation using power tiller and threshing by power thresher. Out of 12985 ha of cropped area 4677 ha (36%) and 1070 ha (32%) is under power thresher operation respectively.

Dohar is the potential area for inland fisheries. It is the second livelihood option for small and landless rural families. Varieties of species are produced through poly and

monoculture. According to DoF in Dohar upazila about 1400 ha. land area is under fish culture and total production is 2024 tons annually. During the last 10 years (2005-2015), fish production in the upazila has reduced by about 68 percent.

Livestock comprised of poultry rearing, cattle and goat/sheep rearing is contributing in nutrition, food security and providing employment opportunities for rural youths especially women. The sector is increasing in growth (133% growth rate).

There are 26 hat and bazars in the upazila and several markets have been developed as growth centers. These markets are used for marketing agro-products.

Agriculture in the upazila is constrained by a number of natural as well as man-made challenges. Major natural challenges are river erosion, prolonged drought, monsoon flood, waterlogging, siltation of riverbeds, and degradation of water land eco-system etc. affecting fisheries sub-sector.

Agriculture sector of the upazila has immense potentials for growth and development. These includes, organizing producers into groups and their capacity enhancement for technology adoption, accelerating producer's access to quality inputs, rural credit and output. Further to these, capacity enhancement of grass-root level extension personnel, encouragement of private investment in livestock and fisheries sub-sectors and introduction of contract farming system for guaranteed by back of agro-commodities.

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Agricultural Scientist

Abbreviations and Acronyms

AEZ	:	Agro-Ecological Zone
ASC	:	Agricultural Service Centers
AIBL	:	Aaima International Bangladesh Ltd.
APB	:	Actionable Policy Brief
BADC	:	Bangladesh Agricultural Corporation
BARC	:	Bangladesh Agricultural Research Council
BARI	:	Bangladesh Agricultural Research Institute
BBS	:	Bangladesh Bureau of Statistics
BCCSAP	:	Bangladesh Climate Change Strategic Action Plan
BJRI	:	Bangladesh Jute Research Institute
BL	:	Bottom Land
BMD	:	Bangladesh Meteorological Department
CBO	:	Community Based Organization
CEGIS	:	Center for Environmental and Geographic Information Services
DAE	:	Department of Agricultural Extension
DAM	:	Department of Marketing
DAP	:	Di-Ammonium Phosphate
DLS	:	Directorate of Livestock Service
DTC	:	District Technical Committee
DoF	:	Department of Fisheries
DTW	:	Deep Tube Well
DUL	:	Desh Upodesh Limited.
FAO	:	Food and Agriculture Organisation of the United Nations
FG	:	Farmers group
FGD	:	Focused Group Discussion
FY	:	Financial Year
FYP	:	Five Year Plan
GAP	:	Good Agriculture Practice
GDP	:	Gross Domestic Product
GO	:	Government Organization
GoB	:	Government of Bangladesh
ha	:	Hector
HVACs	:	High Value Agricultural Commodities
HH	:	Household
HL	:	High Land
HVC	:	High Value Crop
ICT	:	Information Communication Technology
ICT	:	Information and Communications Technology
IPM	:	Integrated Pest Management
JV	:	Joint Venture
KII	:	Key Informant Interviews
LL	:	Low Land
LLP	:	Low Lift Pump
MHL	:	Medium High Land
MLL	:	Medium Low Land
MoF	:	Ministry of Food
MoP	:	Muriate of Potash
NAEP	:	National Agricultural Extension Plan

NAES	:	National Agricultural Extension System
NAP	:	National Agriculture Policy
NARS	:	National Agricultural Research System
NCA	:	National Committee on Accreditation
NFP	:	National Food Policy
NGO	:	Non-Government Organization
NLDP	:	National Livestock Development Policy
NSDS	:	National Sustainable Development Strategy
NSP	:	National Seed Policy
NWMP	:	National Water Management Plan
NWP	:	National Water Policy
NTCC	:	National Technical Co-ordination Committee
PA	:	Precision Agriculture
PRSP	:	Poverty Reduction Strategic Plan
RAP	:	Rural Area Plan
RTC	:	Regional Technical Committee
RoI	:	Return of Investment
SCA	:	Seed Certification Agency
SME	:	Small and Medium Entrepreneurs
SPARRSO	:	Bangladeshi Space Research and Remote Sensing Organization
SPSS	:	Statistical Package for the Social Sciences
Sq.Km	:	Square Kilometer
SRDI	:	Soil Resource Development Institute
STW	:	Shallow Tube Well
TechSuS	:	Technical Support Service
TMC	:	Technical Management Committee
ToR	:	Terms of Reference
TSP	:	Triple Super Phosphate
UNFPA	:	United Nations Population Fund
VLL	:	Very Low Land

GLOSSARY

Household: Persons, either related or unrelated, living together and taking food from the same kitchen constitute a household. A single person living and eating alone forms one-person household.

Community: A community is commonly considered a social unit (a group of people) who have something in common, such as norms, values, or identity. Often - but not always - communities share a sense of place that is situated in a given geographical area (e.g. a country, village, town, or neighborhood).

Union: Smallest administrative rural geographic unit comprising of *mauzas* and villages and having union *parishad* institution.

ii) Village: Lowest rural geographic unit either equivalent to a mauza or part of a *mauza*.

Urban Area: It corresponds with area developed around a central place having such amenities as metaled roads, improved communication, electricity, gas, water supply, sewerage, sanitation and having comparatively higher density of population with majority population in non-agricultural occupations.

Municipality: It includes paurashavas incorporated and administered by local government under Paurashava Ordinance, 1977.

Agriculture holding: An agriculture holding is a techno-economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes without regard to title, legal form or size..

Farm holding: A farm holding is defined as being an agricultural production unit having cultivated land equal to or more than 0.05 acres. Farm holdings are classified into following three broad groups:

Small farm holding: Farm holdings having minimum cultivated land 0.02 hectares but operated land more than this minimum but up to 1 hectare.

Medium farm holding: Farm holdings having operated land in between 1 to 3 hectares.

Large farm holding: Farm holdings having operated land 3 hectares and above.

Non-farm holdings: A non-farm holding is defined as being the one, which has neither cultivated nor operated land or has cultivated land less than 0.02 hectare.

Irrigated area: This is area of total land brought under irrigation coverage for growing crops with irrigations done through mechanical or manual means.

Surface water irrigation: Irrigation with main water sources being rivers, canals, beels, ponds, and other water bodies.

Underground water irrigation: Irrigation with water lifted by shallow tube-wells, deep tube-wells, and country traditional devices.

Cropping Intensity: It is percentage of temporary crops (grown in the field) gross area in comparison with temporary crops net area. It is expressed as follows:

Intensity of cropping = (Total Cropped area x 100) / Net cropped area

Cereals: Main cereals are rice and then wheat, maize, millets, sorghum,

Pulses: Common pulses are gram, mung bean, lentil, pigeon pea, grass pea.

Oil Crops: Main oil crops are rape and mustard, sesame, linseed, groundnut, soybean, sunflower and castor.

Vegetable: a vegetable is any part of a plant (stems, leaves fruit, flower parts, roots, tubers, bulbs), are used as food, consumed by humans as food as part of a savory meal

Summer Vegetables: Vegetables grown in summer season (March to September).

Winter vegetables: Vegetables grown in winter months (from October to February).

Cash crop: Main cash crops are jute, mesta, sun hemp, cotton, sugarcane and tobacco.

Spices: Plants or plant parts (stem, leaves, flower, fruits, seeds, bark, root, etc.) primarily used in cooking for flavoring or taste of food coloring.

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CHAPTER-1: INTRODUCTION

1.1 Background

Increased population and their growing demand for various productions, the area of agricultural land is decreasing day by day. Additionally flood, erosion, drought, cyclone and storm surges are affecting and degrading land resources.. For rationale uses of land, the Ministry of Land (MoL) initiated Coastal Land Zoning project in 2006. The second phase of the program is National Land Zoning Project that was incepted in 2012. Key outputs of those two projects are upazila based land-zoning maps and detailed zoning report.

Bangladesh is an overpopulated and land scarce country. Increased population and their growing demand for various productions, the area for agricultural land is decreasing day by day. Protecting agriculture land and to meet rational needs of other sectors are our great national challenges. Vast majority of the population of the country still live in rural area and are directly engaged in a wide range of agricultural activities including crops, fisheries, livestock and forestry. Land is the basic natural resource that provides habitat and sustenance for living organisms, as well as being a major focus of economic and livelihood activities. Agriculture is the major driver of the economy of the country, through sharing of agriculture in national GDP is declining still its contribution in employment is higher than other sectors. Contribution of agriculture in GDP stands at 16.77 % in 2013-14 (Bangladesh Economic Review, 2014). A study conducted by the UNFPA, in 2010 revealed that agriculture sector provides about 47% employment of labor force in Bangladesh (report presented at NEC conference room on 19 Oct. 2016).

Due to rapid increase of population, unplanned development of rural settlement and rapid urbanization, Bangladesh is losing about 1 percent of its arable land every year. As a result, significant amount of agricultural land is being reduced annually. The process of urbanization is one of the most important dimensions of economic, social and physical development. Rapid urban population growth means an increasing demand for urban land engulfing agricultural land. Urban takes place devouring agricultural lands around urban centres and village settlements. Recent studies revealed that good quality agricultural lands are randomly being used as brickfields all over the country but their concentration is more in the villages adjacent to the big cities. Rapid urbanisation leads to a continuous extension of the city into the rural suburbs, bringing large areas under the direct influence of the urban centres. Around cities, there are dynamic and expanding zones of interaction between urban and rural areas.

According to the 7th Five Year Plan, government policy is to ensure best possible use of land resources and delivery of land related services to the people through modernized and efficient land administration for sustainable development and accelerated poverty reduction. Integrated policies and programs are required to strike balance between the development objectives of protecting the country's productive land base and the problem of housing in rural areas. An appropriate upazila land use plan only can address the aforesaid problems adequately and appropriately. An inclusive development strategy combining the urban and rural areas is the need of the time to make breakthrough in development imbalance. Due importance to planned development of urban centers and their rural hinterlands can produce better results in improving livelihood of the people in general. Organized development of infrastructure and services and control of development can render urban centers congenial places for living and working and serving as the

development disseminators to their vast undeveloped rural hinterlands. So far, the secondary and small towns have not been properly addressed in the context of planned development in national policies and strategies. The small urban centers are likely to play a vital role in transforming the vast rural economy including its production and employment. Therefore, more attention is needed to be paid in developing infrastructure and services in smaller urban centers integrated with their rural zone of influence. There is a need for comprehensive development of upazilas and the upazila headquarters has to be the focal point of all social, administrative, and economic and services of the entire upazila region and bring the services to the doorsteps of the citizens.

Seventh Five Year Plan emphasized on best possible use of land resources and delivery of land related services to the people through modernized and efficient land administration for sustainable development and acceleration of poverty reduction.

In the government's recent policy of overall administrative re-organization, the upazila has been recognized as the most significant tier of the administration. As a local government unit, the Upazila Parishad of the project area has not yet been capable of integrating the rural areas with the urban area in, both, physical and socio-economic terms to implement planned rural-urban development. Government of Bangladesh has decided to develop a comprehensive plan for addressing the required land use transformation, arresting unauthorized and unplanned development either in the urban area or in rural area through identifying constraints and potentials and develop to accommodate all social, economic, administrative and infrastructure services. Integration of rural areas with the urban ones will help to utilize the valuable agricultural land properly as well as save it and guide local development in an organized manner.

For sustainable development approach in agriculture, which encompasses a productive, competitive and efficient way to produce and safe agricultural products, while at the same time protecting and improving the natural environment and social/economic conditions of local communities it is utmost important to adopt a well thought land use plan. Land use planning implies development of a common vision of how people, who live in the area and depend on land and other resources for their livelihood, want to use the land in future.

In the above backdrop, the Urban Development Directorate under the Ministry of Housing and Public Works of the government has taken up an initiative to go for comprehensive planned development of the entire upazila starting with fourteen upazilas initially. A particular focus of the plan would be the assessment of earthquake risk and vulnerability to suggest measures for hazard mitigation.

One of the selected upazilas of the project is the Dohar under Dhaka district, where, apart from town development plan, an effort will be made to prepare strategic plan for a sub-region covering adjacent areas of the upazila. The project will also prepare an urban area plan for urban part of the project upazila apart from structure plan for the entire upazila and rural area plans for selected priority projects.

1.2 The Assignment

The primary aim of this project is to improve infrastructure and services to facilitate overall socio-economic development of the entire upazila. Planned urban development will be a special focus of the project in order to equip urban centres with necessary infrastructure and services to serve as the disseminator of development to its vast undeveloped rural

hinterland. This objective will be attained through preparation and implementation of long-term structure plan and short-term action area plans with urban area plan and rural area plan in between. Development of rural areas will be addressed through rural area strategic plan where improvement of agriculture sector will also be in the agenda. Overall regional development will be the gamut of the sub-regional plan where broad based land use categories will be focused with particular attention on conservation of environmentally sensitive areas.

1.3 Objectives of the Study

a. The major objectives of the study according to the terms of reference (ToR) are:

- i) Study on socio-economic condition of the farming community;
- ii) Assessing present land use and present farming practices;
- iii) Identifying challenges constraining agricultural sector and potentials for development;
- iv) Assessing the changes in the land category, agricultural practices and water management;
- v) Demarcating agricultural land in the upazila and superimposing land and cropping information in the maps;
- vi) Preparing action area plan for five years in areas that are needed for immediate development intervention; and
- vii) Prepare rural area plan showing long-term development strategy for 20 years.

b. Other minors are:

- i) Generate information necessary for the preparation of the agricultural development plan;
- ii) To earmark agricultural land for conservation on the basis of land topography (high, medium and low) soil properties (sandy, loamy, loamy sand, clay loam and clay) and crop suitability (high, moderate and low) for crop production in the face of rapid transformation of arable lands into nonagricultural ones;
- iii) To identify needs of the local population for growing high value agricultural commodities (HVACs);
- iv) To identify challenges and potentials of HVACs production and value chain management in the urban fringe as well as in apparent rural areas;
- v) Delineation of land according to single, double and triple cropping potentials as well as productivity and overlaying the information on proposed land uses along with recommendations for specific land use practices considering constraints;
- vi) Developing several layers of information on socio-economic condition of the farming community, traders, entrepreneurs and market infrastructure for agro-commodities to be included in the Rural Area Plan (RAP).
- vii) Propose a short, medium and long-term development plan for sustainable agricultural development.

1.4 Brief Description of Dohar Upazila

Dohar an upazila of Dhaka District in the Dhaka of Bangladesh situated in the southernmost part of Dhaka District. Dohar Thana was formed in 1926 and it was turned into upazila in 1983. The upazila is one of the hinterland of the Dhaka Mega City and located in between 23°31' and 23°41' north latitudes and in between 90°01' and 90°13' east

longitudes. It is bounded by Nawabganj (**Dhaka**) upazila on the north, the Padma river and Sadarpur upazila on the south, Srinagar and Nawabganj (Dhaka) upazilas on the east, harirampur and char Vodrason upazilas and the Padma river on the west. The Padma River borders the southern part of the upazila. Total area of the upazila is about 161.49 sq. km and total population is 226, 439 (Population Census, 2011).

Fertile plain land, vegetation, river sand, canals, beels etc. bless the upazila. The agro-climatic condition of the upazila is suitable for cultivation of multiple crops. About 59 percent of the land is intensively cultivated (Consultation workshop at DAE, Dohar, 2016). Being comprised predominantly of medium high and medium low land, varieties of crops, most of which are high value such as jute, wheat, maize, pulses, sweet potato, onion, garlic, chili, mustard, vegetables, etc. are grown here. The main crops grown in the area is Boro rice or dry season rice. On the other hand, the Aus rice covers a small area.

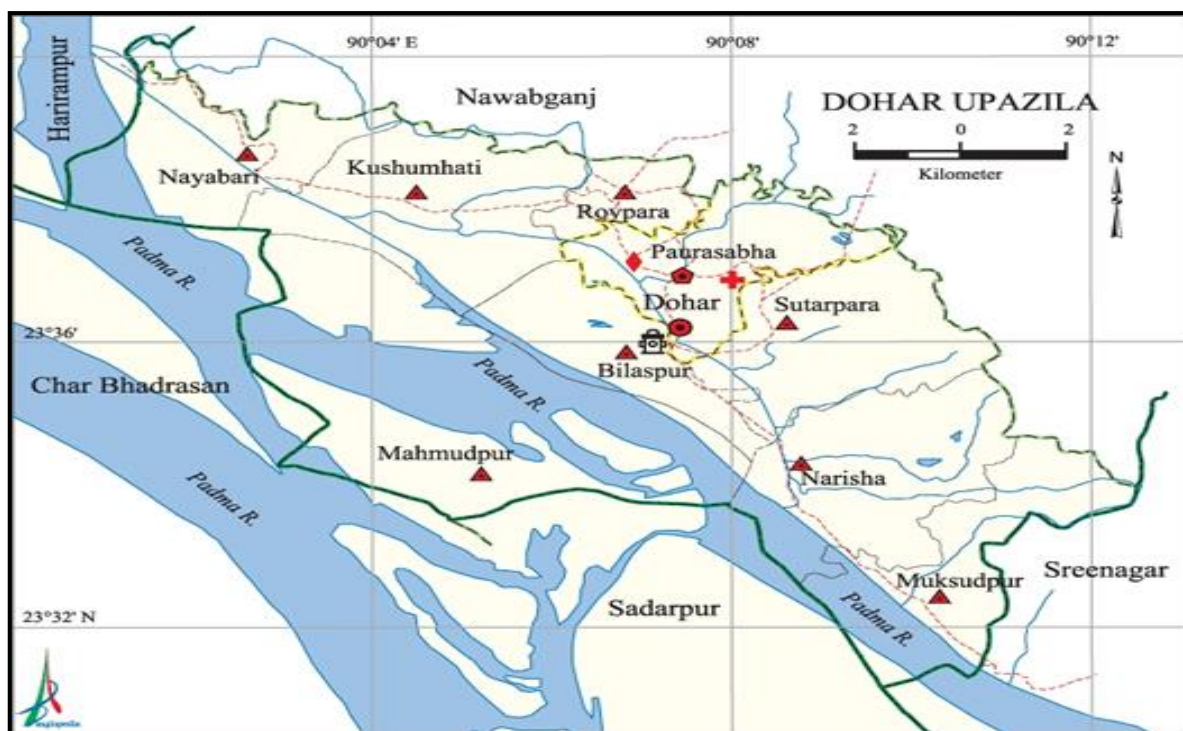
Fishery is the second important sub-sector in agriculture and fish production contributes to the livelihoods and employment of rural people of the upazila. The culture practices capture fisheries management, canal, small ditches, khal; consumption of fish therefore has important implications for food and nutrition. Dohar share a vital role in livestock sub-sector, by providing milk, meat and eggs. Non-irrigated areas in beel and chars have great opportunity to dry season cattle grazing and production of fodder and abundant aquatic vegetation provides rich grazing for domestic livestock and an alternative source of fuel and fertilizers for the local people. On the other hand, the upazila is susceptible to natural and human induced disasters like flood, siltation, erosion, drought, water pollution, loss of fertile agricultural land and housing in agricultural land etc.

There is no natural forest or reserve forest managed by Forest Department in Dohar upazila. Homestead forests, trees in the fringe land and on road/river bank constitute the forest resource of the upazila.

Various human interventions are key players responsible for degradation of valuable land resources. Land use pattern of the upazila is changing, creating pressure on land resources. Absence of pragmatic strategies towards conservation of natural resources has been experiencing a high degree of environmental degradation of Dohar Upazila.



Map 1.1: Dohar Upazila in Dhaka (red colored) (Banglapedia, 2015)



Map 1.2: Dohar Upazila (Banglapedia, 2015)

1.5 Approaches and Methodologies

Different approaches and methodologies have been followed in the study. These are, review of secondary information, household survey, consultation with stakeholders, analysis of national policies and plans, analysis of collected data and synthesis of information. The detailed discussions of approaches and methodologies are made in the following paragraphs.

1.5.1 Approaches

- Review of secondary information
- Household survey for quantitative data
- Rapid Appraisals like, FGDs, purposive visits, in-depth interviews, and formal & informal discussion with various stakeholders
- Overlaying collected information on satellite imagery
- Data processing using statistical packages for social science (SPSS) and Microsoft Excel.
- Data analyzing following SPSS
- Preparation and submission of report addressing comments of different stakeholders and especially TMC members.

1.5.2 Methodology

a) Data Collection

Primary Data Collection

Both quantitative and qualitative primary data, related to land and soil type, existing land use and cropping pattern have been collected through a number of sequential steps as follows:

i) Household Survey: Quantitative data relevant to peri-urban (the grey area which is neither entirely urban nor purely rural in the traditional sense) and rural agricultural activities at household level has been collected through sample survey using a semi-structured questionnaire. HH survey program of the study had a section for farm household information of agricultural practices, current land use along with irrigation facilities & farm mechanization, present cropping system, cropping pattern and level of technology use by farmers especially for producing high value agricultural commodities (HVACs). Stratified random sampling procedure was adopted to select the size of the sample with 95% confidence level and ± 5 precision level. HH survey has been conducted with a sample of 555 respondents.

ii) Qualitative Data Collection: For qualitative data collection one focus group discussion (FGD) with DAE field officials, three key informant interviews (KIIs) with DAE, DLS and Fisheries officers at upazila level have been conducted.

iii) Secondary Data Collection: Secondary data related to land and soil type, existing land use and cropping pattern of the upazila has been collected through reviewing of secondary information as follows:

- Information about soil suitability of urban fringe and rural areas have been collected from SRDI and BARC and other NARS Institutes;
- Present status of crop, livestock and fishery related statistics have been collected from BBS, DAE, DLS and DoF;
- The base map, water resource maps, land use maps and other related information of the study area have been collected from SRDI, BARC and Bangladesh Space Research & Remote Sensing Organization (SPARRSO);
- Other relevant documents have been collected from different books, Journals, and Web domains;

b) Data Processing and Analysis

Collected data has been processed using different techniques. The primary data has been processed by statistical package for social science (SPSS) and Microsoft Excel.

CHAPTER-2: AGRICULTURAL POLICY FRAMEWORK

2.1 Introduction

In order to face the ultimate challenges of food scarcity against constantly increasing population, the Government of Bangladesh has taken a number of initiatives on policy formulation and their implementation.

Development of the agriculture sector is generally governed by a number of related national policies. National Agriculture Policy (NAP) 2013 is obviously the key guiding document for implementation of development agenda for the sector. The other related policy documents are New Agricultural Extension Policy (NAEP) 1996, National Food Policy (NFP) 2006, National Fisheries Policy 1996, National Livestock Policy 2007, National Water Policy 1999, National Forestry Policy 1994, National Integrated Pest Management Policy 2002, National Poultry Development Policy 2008 and the overarching National Sustainable Development Strategy (NSDS) 2013.

2.2 National Agriculture Policy, 2013

The prime objective of the National Agriculture Policy (NAP, 2013) is to ensure food and nutrition security for all and to improve the quality of life of the rural people through increased productivity and agricultural diversification. The document emphasizes sustainability and profitability agricultural production; research and extension; productivity enhancement; employment and income generation through commercialization, adaptability to climate change, developing market, agro-processing and agro-based industries, and promoting export of agricultural products. The policy stressed the need for innovative improvement for e-agriculture and use of Information and Communications Technology (ICT) in agricultural extension. To ensure farm level supply of quality seeds, the policy encourages participation of private sector along with public sector in seed production and marketing. The quality issue of seed and fertilizer were sufficiently emphasized in the document. For judicious use of water resources in farming, the policy emphasized enhancing water use efficiency. It encouraged use of surface water and solar energy for irrigation, wherever possible. For water scarce areas it suggested using force mode pump instead of suction mode pump. In case of agricultural machinery, the policy suggested to continue import subsidy and encourage innovation of climate sensitive technologies.

The NAP, 2013 duly emphasized developing agricultural marketing system through improving infrastructure and establishing uninterrupted value chain between producers and consumers. The policy suggested establishing local level storage facilities and agro-processing industries. The document also mentioned the importance of women involvement in different agricultural activities, particularly in homestead gardening, seed production, bee rearing, food processing and storage etc. It also suggested for elimination of wage discrimination between men and women in agriculture.

The NAP, 2013 recognized several weaknesses and threats, which may hinder successful implementation of different programmes. The constraints include less developed market infrastructure, lack of diversification, and high volume of post-harvest loss, financial constraints, limited availability of agricultural credit from formal sources, inadequacy of climate sensitive agricultural technologies and inadequate use of ICT technologies. The development of the sector is also threatened by factors like, environmental hazards,

deteriorating soil quality, continued reduction of arable land and water, loss of agricultural bio-diversity, excessive and imbalanced use of pesticides and inadequate budgetary allocation especially for agricultural research.

Very little or no progress has been observed in the light of NAP 2013 in respect of value chain management agro-commodities as well as women engagement in agriculture. No significant improvement made in agriculture market infrastructure development and agro commodities storage facilities development. With the construction of the Padma Multipurpose Bridge, the opportunities of agro-commodities marketing export from Dohar is expected to increase manifold. The upazila agriculture sector is far from climate sensitive technology dissemination and use of ICT in agriculture. Irrigation water use efficiency and management level of the upazila need to be harnessed in the light of the NAP 2013.

2.3 National Agricultural Extension Policy, 2012

The revised National Agricultural Extension Policy (NAEP, 2012), provides extension policy directions for transferring technologies to crop, fisheries and livestock sector development. The macro-economic scenario, agro ecology/bio-ecological zones and current issues in agricultural production, land ownership and tenancy, poor soil health status, decreasing agricultural land, irrigation water scarcity, lack of good agricultural practices, high demand of quality seeds/planting materials etc., livestock and fishery issues including emerging challenges and perspectives have been pointed out for strong consideration.

The mission of this NAEP is to provide efficient and effective decentralized demand responsive integrated extension services to all categories of farmers, producers and small & medium entrepreneur (SME) in agriculture through farmers group (FG) and their federations at union, upazila, district and national level, to enable them to optimize their use of resources, in order to promote sustainable agricultural, agri-business and socio-economic development.

The NAEP is built on nine (9) key principles:

1. Increasing production (horizontal and vertical) and productivity as a whole;
2. Cost effective efficient decentralized demand responsive extension services;
3. Targeting and mobilizing farmers group (FG) and their federations (FO);
4. Bottom-up planning and implementation;
5. Coordinated and integrated extension services through NAES;
6. Development of agri-business and contract farming for export promotion;
7. Adoption to climate change and development of specialized extension service for climatically distressed areas;
8. Broad based extension support (in-time input support and subsidies, credit, price enhancement etc.); and
9. Digitalized agricultural extension services (e-agriculture).

The goal of the National Agricultural Extension Policy is to, “Encourage the various partners and agencies within the National Agricultural Extension System (NAES) to provide efficient and effective coordinated services which complement and reinforce each

other, in an effort to increase the efficiency and productivity of agriculture in Bangladesh for ensuring food security and business development”.

To achieve the above goal in relation to different agriculture related policies of Bangladesh, the NAEP emphasis on:

- i) Coordinated and integrated Extension services,
- ii) Promotion of farmers’ group formation and their federation, iii) capacity building of farmers’ groups,
- iii) Implementation of market led, demand driven, pluralistic and decentralized bottom-up extension system,
- iv) Strengthening “one-stop service center”,
- v) Development of agribusiness and market linkage,
- vi) Promoting e-agriculture,
- vii) Strengthening research-extension- farmers linkages,
- viii) Strengthening urban agriculture,
- ix) Strengthening ppp in agriculture,
- x) Strengthening supply of quality seeds and other inputs
- xi) Emphasizing organic farming/ green farming,
- xii) Mainstreaming women in agriculture,
- xiii) Emphasizing homestead gardening,
- xiv) Thrust on farm mechanization,
- xv) Industry linkage for enhancing agro-based industries and xxi) Strengthening Monitoring and evaluation.

The revised National Agricultural Extension Policy 2012 provides policy directives for quicker transferences of modern technologies for crop, fisheries and livestock sub-sectors toward productivity enhancement and product quality and safety improvement. But unfortunately in Dohar upazila public service providing agencies are unaware about the objectives of the policy. They are operating in the old fashion with the under developed and handicapped instruments and with less skilled manpower and or lack of adequate manpower, especially in fisheries and livestock sub-sectors. DAE is supposed to provide demand driven extension service, but how the technology demands of farmers are assessed is not clear. Census once conducted for need assessment of the farming community is now not in practice. Upazila agricultural extension program planning is not in practice now. Participatory extension program planning on the basis problem census is required to be executed to ensure decentralized and bottom-up planning.

2.4 The Ground Water Management Ordinance, 1985

The ground water management ordinance 1985 is an ordinance to manage the groundwater resources for agricultural production. According to the Ordinance, no tube well (means a deep tube well, shallow tube well, suction lift hand-pumped well or deep-set hand pumped well used for irrigation or water supply) shall be installed in any place without a license granted by the Upazila Parishad. Upazila Parishad after necessary enquiry, through Upazila Irrigation Committee considering the aquifer condition of the soil, distance of the nearest existing tube well and the area likely to be benefited by the tube well and its impacts on water availability of other installed tube well will issue license. The Upazila

Parishad has been empowered to suspend or cancel the license on proper reasons. Implementation of ground order ordinance need to be accelerated in Dohar Upazila.

2.5 National Water Policy, 1999

Government of Bangladesh has adopted the National Water Policy, 1999. That prioritized the importance of increasing irrigation water use efficiency through various measures including drainage-water recycling, rotational irrigation, adoption of water conserving crop technology, and conjunctive use of groundwater and surface water. The policy promised to continue support for private development of groundwater irrigation with simultaneous development of surface water irrigation where feasible. The policy expressed serious concerns regarding water pollution through residues of fertilizer and pesticides that are either leached to the groundwater or washed off the fields to rivers and lakes.

The NWP has 16 components, which describes policy measures to be undertaken to achieve the above objectives. These policy measures include: (1) river basin management, (2) planning and management of water resources, (3) water rights allocation, (4) public and private involvement, (5) public water investment, (6) water supply and sanitation, (7) water and agriculture, (8) water and industry (9) water, fisheries and wildlife, (10) water and navigation, (11) water hydropower and recreation, (12) water for environment, (13) water for preservation of haors, baors, and beels, (14) economic and financial management, (15) research and information management and (16) stakeholder participation.

The NWP, emphasizes, among others, three interrelated issues such as water and agriculture, water, fish and wild life, and water for preservation of haors, baors and beels. One of the notable policy directions in the NWP was to encourage private sector development of groundwater for irrigation and also to emphasize surface water augmentation.

2.6 Bangladesh Water Act, 2013

The recently published Water Act 2013 is based on the National Water Policy, and designed for integrated development, management, extraction, distribution, usage, protection and conservation of water resources in Bangladesh. In general, if one takes a critical look at the Act, the new law has provided the right framework for better management of water resources in the country. The Water Act 2013 is based on the National Water Policy, and designed for integrated development, management, extraction, usages, protection and conservation of water resources in Bangladesh.

In view of water resources protection and conservation, the Act adopted a timely decision to address the water needs in irrigation and urban areas in the context of available surface water, groundwater, and rainwater. The need for water resources management in the context of natural drainage pattern has also been correctly highlighted in the Act. Management of water resources within the territory of the country in rivers, creeks, reservoirs, flood flow zone, and wetlands has been assigned to the Executive Committee under the Ministry of Water Resources. In summary, the Act recognizes the significance for managing all forms of water resources in the context of natural flow of surface water and recharge of groundwater. The Act provides the legal framework for development, management, extraction, distribution, usage, protection, and conservation of water resources. However, the Act falls short in making a commitment by the government to

ensure the quality of water for various beneficial uses.

2.7 National Seed Policy, 1993 and Seed Rules, 1998, Seed Act of 1977, Seed Act (Amendment) 1997, Seed Act (Amendment) 2005

Quality seed is considered the basic input for increasing agricultural output and thereby achieving self-sufficiency in food production. Effectiveness of other inputs like, fertilizer and irrigation depends largely on good seed. However, use of improved seed is still very limited. Two major reasons behind this fact are:

- Production and distribution of quality seed is insufficient in the public sector as compared to its demand;
- Seed production in the private sector not yet has the necessary support.

National Seed Policy provides policy directives to increase production of improved seed both in the public and private sectors and for making best quality seeds available to the farmers on timely basis, and at competitive price. The seed policy has also provisions, among other things, for liberalization of import of seed and seed processing machineries, strengthening of quality control and research system and maintaining a seed security arrangement. A major thrust of the seed policy has been on the institutional arrangement of the seed sector.

Government has already declared the National Seed Policy with the objective of promoting seed industry in the private sector. The basic objectives and strategies of the National Seed Policy (NSP) are of three types, i) strengthening BADC capacity, ii) allowing the private to produce seeds of approved varieties as well as develop new ones, and to iii) import seeds from abroad. For this purpose, importation procedures were simplified. The NSP and Seed Rules make a number of provisions that could guarantee quality of seeds either produced domestically or imported. First, any variety, whether imported or domestically developed, must be registering new seed variety and packaging seeds in labeled containers, must be registered. Finally, the Seed Certification Agency (SCA) must certify all varieties of seed.

2.8 National Water Management Plan, 2001

This framework plan aims to guide (but not prescribe), in an integrated and comprehensive manner, the actions of all concerned with development and managing water resources and water services. The purpose of the NWMP is to operationalize directives given in the National Water Policy and in accordance with the government approved development strategy.

The objectives of the NWMP are, to contribute in a balanced fashion to the overall national goals of economic development, poverty alleviation, food security, public health and safety, decent standard living for the people and protection of the natural environment. It is a rolling plan and updated in five years' interval providing a firm plan for the first five years, an indicative plan for the subsequent five years and perspective plan for the long term (25 years), all set in the context of what may happen at least 50 years ahead.

2.9 National Food Policy, 2006

The Ministry of Food (MoFood) has prepared the National Food Policy (NFP) with FAO support. The NFP clarifies three basic concepts: food security for all people, access to food

depending on household income and food prices and health care, taking care of nutritious food and improvement of health care system. Given these basic concepts, the major objectives of the national food policy, which aims at ensuring dependable food security for all, are the following:

- a. Adequate and stable supply of safe and nutritious food at affordable prices;
- b. Increased physical, social and economic access and purchasing power of all people; and
- c. Adequate nutrition for all individuals, especially children and women.

The strategy for ensuring adequate and stable supply of safe and nutritious food at affordable prices; depends on improvement of domestic food grains production and food import. This will be realized through (i) improving agricultural research and extension, (ii) efficient use of water resources, (iii) availability of agricultural inputs and their efficient use, (iv) agricultural diversification and improved agricultural technology- promotion of non-food grain crops (vegetables, oilseeds, pulses and fruits), development of poultry, fisheries and livestock, increasing agricultural productivity and reducing post-harvest losses and disease/pest prevention. The second strategy is the development of efficient food market: (i) development of market infrastructure, (ii) encouragement to private sector by promoting private storage and movement of food items, liberal credit for food items and development and enforcement of quality standards and (iii) development and dissemination of early warning and market information. The third strategy is the non-discretionary food market intervention for price stabilization, which is to be realized through (i) price incentives for domestic food production, (ii) public food grain stock and (iii) consumer price support.

The second objective- increased physical, social and economic access and purchasing power of all people- involves three sets of strategies. The first strategy is the transitory shock management, which includes (i) special measures for disaster mitigation for agriculture, (ii) emergency distribution from public stock and (iii) measures for increased supply through private trade and stock. The second strategy is the effective implementation of the targeted food-assistance programs. Moreover, the final strategy is the employment-generating income growth to pursue through (i) support to women in income generating activities, (ii) investment in employment enhancing technology, (iii) fiscal incentives for agro-based and rural industries, (iv) education skill and human resources development and (v) broad-based labor-intensive growth promoting macro policy. The final objective-adequate nutrition for all individuals, especially children and women will be achieved through the following measures: (i) sufficient macro-nutrients and enhance nutrition for the vulnerable group, (ii) safe and quality food supply, (iii) safe drinking water and improved sanitation, (iv) balance diet containing sufficient micro- nutrient and (v) adequate health status.

2.10 The National Livestock Development Policy, 2007

NLDP, 2007 identifies ten critical policy areas. These are, Dairy Development and Meat Production, Poultry Development, Veterinary Services and Animal Health, Feeds and Fodder Management, Breeds Development, Hides and Skins; Marketing of Livestock Products; International Trade Management of this sector, Access to Credit and Insurance; and Institutional Development for Research and Extension. Besides, the ministry can ensure participation of women in the programmes/activities of this ministry as stated in

the national policies formulated by it including the National Poultry Development Policy, 2008 and the Microcredit Disbursement Rules, 2011. The programmes/activities being carried out by this ministry include rearing of cattle and poultry, fish cultivation, processing, and marketing. This ministry can play an enterprising role to ensure that the women get the due part of the benefit out of these activities.

2.11 National Fishery Policy (1998)

The policy aims to enhance fisheries production and improve socio-economic conditions for households where capture fishing is the main activity; to meet the demand for animal protein; to boost economic growth by exporting fish and fisheries products and finally to maintain an ecological balance. The policy also highlights the need to conserve fish habitats, especially in the development of water management infrastructure. Through the formulated policy, the Government of Bangladesh expressed its determination to prevent further drainage of standing water bodies for agricultural development, and to promote fisheries development in all water bodies.

2.12 National Land Use Policy (2001)

The National Land Use Policy was adopted by government in 2001, setting out guidelines for improved land-use and zoning regulations. The policy was issued by the Ministry of Land but the government has difficulties with implementation partly ascribed to the dispersion of land administration authority among many different ministries. To increase effectiveness and credibility of such reforms the government should focus on decentralized and concentrated services. The content of the National Land Use Policy is as follows:

- i) Stopping the high conversion rate of agricultural land to non- agricultural purposes;
- ii) Utilizing Agro-Ecological Zones (AEZs) to determine maximum land- use efficiency;
- iii) Adopting measures to discourage the conversion of agricultural land for urban or development purposes;
- iv) Improving the environmental sustainability of land-use practices.

2.13 PRSP- Agriculture and Rural Development

The PRSP places agriculture and rural development as the key driver of pro-poor growth strategy. Government's overriding policy is to create enabling environment and support the transformation of subsistence agriculture to a more diversified commercial agribusiness with significantly increased participation of private sector. For crop and non-crop sector growth, PRSP put emphasis on achieving productivity and profitability gains, broad-based support to agriculture, diversification and commercialization of agricultural enterprises in the face of trade liberalization under globalization. PRSP also stressed on crosscutting issues, i.e. agricultural research and technology generation, farmers' demand-led extension services, energizing agricultural marketing and agro-processing, land use and women in agriculture.

The most important contribution of PRSP exercise on agriculture is the formulation of a reasonably precise and workable policy matrix, which identifies 22 crucially important strategic goals, fixes up targets against these goals, charts actions already taken, sets future policy agenda and priorities and delineates responsibilities for the concerned ministries. The lead ministries established its ownership by playing active roles in fixing the policy

priorities, which were then seeped through wide range of participation from the mainstream ministries, agencies, academia, NGO and civil society groups.

2.14 National IPM Policy, 2002

Crop pest control through chemical means has been the primary method in Bangladesh. After transfer of pesticide business to private sector in 1979, due to increased rice area, increase in cropping intensity and an increase in the area under high yielding varieties pesticide use increased to a dangerous level. Over dependence on chemical pesticides is not only expensive but also leads to negative environmental impacts, in addition to increased health hazards to both the grower and consumers of crops. There is a need for an alternative method rather than to rely solely on pesticides. Integrated Pest Management (IPM) has now been considered as the most appropriate one in this respect.

To enable farmers to grow healthy crops in an increased manner and thereby increase their income on a sustainable basis while improving the environment and community health Government of Bangladesh adopted IMP policy in the year 2002. The key components of the IPM policy are: i) maintaining ecological balance, ii) executing appropriate actions on pesticides, iii) operating an effective system for implementing the national IPM program, iv) developing human resources as the core of IPM, v) conducting research on IPM, and vi) maintaining Ecological Balance.

2.15 Actionable Policy Brief and Resource Implications (APB)

An Actionable Policy Brief (APB) was prepared in 2004 by the GoB. The APB is based on the overarching national goal, food security, which means sufficient cereal stock in the country. The APB is built on a solid conceptual framework, focused vision for the future, indicators of comparative advantages, competitive strength and profitability that will guide the development of each crop subsector, constraints to moving forward and key challenges that must be faced in achieving the overall objective of promoting food security for all in the country. The critical policy areas addressed in the APB include production and distribution of seed; production, import, pricing and marketing of fertilizers; land use, minor irrigation, mechanization, marketing and agribusiness, agricultural research and agricultural extension.

Seed: The APB team has identified the major constraints facing the seed sector and made several recommendations to overcome those constraints. The most important ones relate to facilitating quality seed development in private sector, training farmers on quality seed production and preservation, strengthening seed certification, bolstering National Seed Board, rationalizing seed subsidy and ensuring level playing field for private sector seed developer.

Fertilizer: The APB emphasized three concepts- timely supply, adequate quantities and fair prices- as the key issues in the fertilizer policy. However, timely and adequate supply does not guarantee farmers to use proper doses unless they can buy fertilizers at fair prices at the time they need it. While privatization of fertilizer distribution since mid-1970's has generally improved availability of fertilizer, it has not necessarily succeeded in eliminating supply bottlenecks and ensuring fair prices of fertilizers at farm level. Fertilizer subsidy has also not guaranteed farmers the proportionate benefits, major share of subsidy benefits being grabbed by the fertilizer traders. The prominent constraints include depletion of soil nutrient, lack of awareness program, risk of crop failure, imbalanced use of fertilizer,

deficiency in micro-nutrient and organic matter.

Land: The land use policy guideline was first introduced in the NAP prepared by the MoA in 1999. Then the Ministry of Land prepared a grand policy statement in 2001. APB recognizes the problems of implementing land policy, which arise from the fact that land administration falls into the domains of many ministries. The national land use policy recommends the following important measures: (i) halting the present alarming rate of conversion of agricultural land to non-agricultural purposes, (ii) preparing guidelines for maximum land utilization based on AEZ characteristics, (iii) discouraging acquisition of agricultural land for urbanization or for other development projects, and (iv) reducing environmental pollution and degradation of land, water and air and promoting environmentally friendly activities in agricultural development.

Minor irrigation: The APB team has identified factors constraining the development of minor irrigation and put forward several recommendations for removing those constraints. One of these recommendations includes reducing farmers' irrigation costs. There are two major ways to do this. First, subsidies may be provided on fuel as well as on the import of irrigation equipment. Second, supplying electricity to power-driven machines. However, the policies have missed one important point that not all farmers using irrigation facilities own the irrigation appliances. They used to buy water from pump owners under various payment system- cash, kind or hourly basis. This means that reduction of pumping costs through diesel or electricity subsidy will not benefit the pump owners and not necessarily the farmers buying water because there is no way to make the water sellers to reduce water charges.

Mechanization: The APB identifies several constraints to desirable level of mechanization, which are (i) lack of knowledge and skill for efficient use, proper maintenance and repair of machinery at all levels of users, artisans and traders, (ii) absence of any public sector agricultural extension activity involving farm machinery or mechanization, (iii) poor quality of fuel and lubricating oil available in the village areas, (iv) Scarcity of proper spare parts, replaceable tools and accessories and adequate aftersales services, (v) poor quality of many imported as well as locally fabricated machines, (vi) low tariff on imported machines and high tariff on materials of fabrication (especially carbon steel), (vii) absence of product standards and quality certification (for both imported and locally made items) for helping traders and users to make informed choices, (viii) absence of adequate design and fabrication guidelines, technical facilities and credit sources for local manufacturers, and (ix) lack of community threshing floors often impedes the use of threshing machines near the harvest areas especially in the haor regions of Bangladesh. The APB team makes several useful recommendations that are supposed to address these constraints. One important point missing from the report is that it does not recognize the importance of the growing market for power tiller services and thus it fails to pinpoint the implications of rationalizing import duty on power tiller accessories and development of infrastructure favoring power tiller growth.

Marketing and Agribusiness: The APB has discussed agribusiness constraints under eight groups- policy, institutional, infrastructural, human resources, information, quality Control. The APB team also makes valuable recommendations aimed at removing those constraints. These include establishment of an expert committee to review agribusiness status periodically, establishing agro-export processing zones, setting up a separate 'center for agricultural market research, intelligence and certification' by restructuring and renaming DAM, amendment of the agricultural markets produce regulation act of 1964,

increased investment in market infrastructure, and arranging technical assistance and credit for improving preservation, packaging and transportation of agro-products, formulation of a comprehensive 'agribusiness policy' involving the private sector, establishment of an 'agribusiness development fund', and establishment of a 'market feeder road development and maintenance fund'.

Agricultural Research: The APB team analyzes agricultural research problems as the constraints faced by the NARS institutes and the NARS constraints are flagged as lack of quality human resource and funding, inflexible institutional and management system, and absence of decentralization of authority limiting freedom of research management. What the APB misses is a reflection on the new agenda for agricultural research in the changing national priorities towards pro-market technology generation and for protecting the interests of small farmers in the face of global competition. In addition, the deplorable state of agricultural statistics and institutional obstacles to information flow, which hinder quality agricultural research, are not addressed at any great length.

Agricultural Extension: In the backdrop of a long list of weaknesses of DAE, the APB team points out four major constraints/issues to be addressed for desirable development of agricultural extension system. These constraints/issues include blueprint agriculture and ecological problems, participatory technology development and extension, addressing equity and ecological problems, and group approach in extension. APB recommends formation of 'Specialized Agricultural Service Centers' (SASC) at the upazila level and one stop extension service at the union level', development of a comprehensive training program for the farmers, input dealers, seed producers and field technicians at the upazila level, adoption of community (village) or group based extension and training system to develop group farming, establishment of a permanent 'Advisory Committee on Agricultural Research and Extension', building soil-testing capacity at upazila level and strengthening SRDI capacity.

2.16 Bangladesh Climate Change Strategy and Action Plan (BCCSAP)

Bangladesh Climate Change Strategy and Action Plan 2009 is an updated and revised version of the Action Plan prepared in 2008. Bangladesh is one of the most vulnerable countries in the world due to climate change. The lives and livelihoods of millions people living in the climate hotspots are badly affecting due to climatic variability. Climate changes are a potential threat to human welfare and also challenge to development. The Climate Strategy and Action Plan of Bangladesh is a part of overall development strategy of the country. The climate change constraints and opportunities are being integrated into the overall plan and programs involving all sectors and processes for economic and social development.

The plan is built on six pillars: i) food security, social protection and health; ii) comprehensive disaster management; iii) infrastructure development to protect the assets; iv) Research and knowledge management; v) Mitigation and low carbon development; and vi) capacity building and institutional strengthening.

2.17 7th Five-Year Plan

The 7th Five Year Plan has been conceived with other agenda to fix development strategy for agrarian economy in Bangladesh, bring dynamism in public-private investment, and diversify products to boost export. The SFYP emphasized in maintaining

food security by raising productivity, profitability and higher growth in crop agriculture through diversified and high value crop production, more value addition, increasing efficiency in resource utilization and judicious use of agricultural inputs; promoting science-led technology system and disseminating improved technologies; reducing loss of arable land; minimizing yield gaps, increasing production, distribution and preservation of quality seeds; reducing output loss through technology based weather prediction. The plan emphasizes crop Zoning and land Use Planning as per productivity of land, availability of technologies and marketing facilities. For resource conservation and judicious use of inputs, the 7th FYP will give more focus on the Precision Agriculture (PA). To ensure economic use of water resources irrigation efficiency will be ascertained and modern water management technology will be promoted to enhance irrigation efficacy. During the plan period, emphasis will be given to promote Good Agricultural Practices (GAP) suitable for Bangladesh agro-ecological and socio- economic conditions intensify crop production and to reduce dependency on animal, production cost, enhance productivity and profitability of land, labour and inputs. Farm mechanization will be promoted further to reduce harvest and post-harvest losses, production costs, and drudgery of farm workers and to ensure timely operation. 7th FYP will support SMEs in agro-processing to utilize seasonal surpluses in several agricultural commodities of perishable nature and to prevent postharvest losses and to enhance farmers' income. For efficient technology transfer and to ensure demand led research and extension the Regional Technical Committee (RTC) and District Technical Committee (DTC) and National Technical Co-ordination Committee (NTCC) will be revived during the plan period.

Livestock sector development strategy of 7th FYP is to extend DLS service with increasing resource allocations for providing better services in regulatory measures, quality assurance and control, monitoring function, food safety function, disease surveillance, while private sector, NGOs and CBOs (Community Based Organizations) would be encouraged to provide more services of the livestock. Govt. will reduce the demand and supply gap, supply chain based production, processing and marketing of milk and milk products; promoting cooperative dairy development and smallholder dairy farming integrated with crop and fish culture.

7th FYP will stress on increased production of fish through enhancing productivity, livelihoods security and equitable distribution of benefits side by side with the conservation of potential fisheries resources and aquatic biodiversity of rivers, beel, haor, baor, flood plains and other water bodies. Priority areas of the sector will be to control of pollution of the rivers; prevent further deterioration of water logging, blockade of water-flows and shrinkage of water- bodies by infrastructures like embankment, roads, urban housing projects and industrialization

In the 7th FYP social forestry programs will be continue for expansion and strengthening of upazila nurseries, union level nurseries. An estimated 20,000 km. of strip plantations will be raised during the plan period. For the prevailing demand through social forestry, short/medium rotation fast growing tree species will be planted along the roads and embankments, and on marginal and fellow lands with active participation of local people and NGOs.

CHAPTER-3: BIOPHYSICAL RESOURCES

3.1 Climatic Condition

Climate is the long-term average of the weather condition. It is defined not only by average temperature and precipitation but also by the type, frequency, duration and intensity of weather events such as heat waves, cold spells, storms, floods and droughts.

Bangladesh agriculture, especially the crop sub-sector is markedly influenced by seasonal characteristics and different variables of climate such as temperature, rainfall, humidity, day length etc.

Cropping Season: In Bangladesh there are four distinct seasons, summer (pre-monsoon) season (March to May), rainy (pre-monsoon) season (June to September), autumn (post-monsoon) season (October-November) and winter (December to February) season. Agro-climatic requirements of crops determine the growing season. Though there a number of crops grown all the year round yet there are good number of crops grown in a particular season, and also there other crops grown in both the winter and summer season.

Temperature: Temperature is the most vital factor for agriculture. It influences crop production, livestock, fisheries and forestry. Every crop has a temperature range for their vegetative and reproductive growth. When temperature falls below the range or exceed the upper limit crop production faces constraints. On average the temperature are always high. The warmest month is April and the coolest month is January (Fig. 3.1).

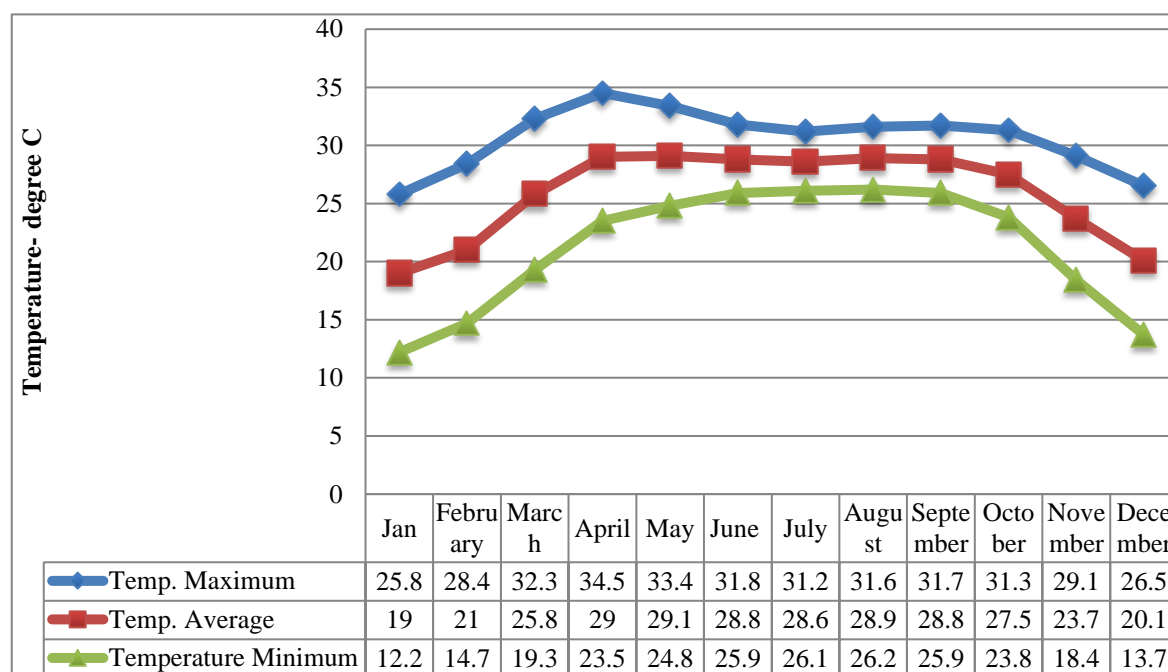


Figure 3.1: Average Temperature in Dohar (Source: <http://www.weatherandclimate.com>)

The fig 3.2 reveals that January is the sunniest month and during August, lowest amount of sunshine is available



Figure 3.2: Average Monthly Total Hours of Sunshine over the Year

Rainfall: Rainfall is one of the major climatic factors for crop production. All crops have critical stages when it needs water for their growth and development. Moreover, excessive rainfall may occur flood and waterlogging condition that also leads to crop loss again scarcity of water limits crop production. The figure 3.3 reveals that a lot of rain falls in the months of April, May, June, July, August, September and October. It has a dry period from November to January.

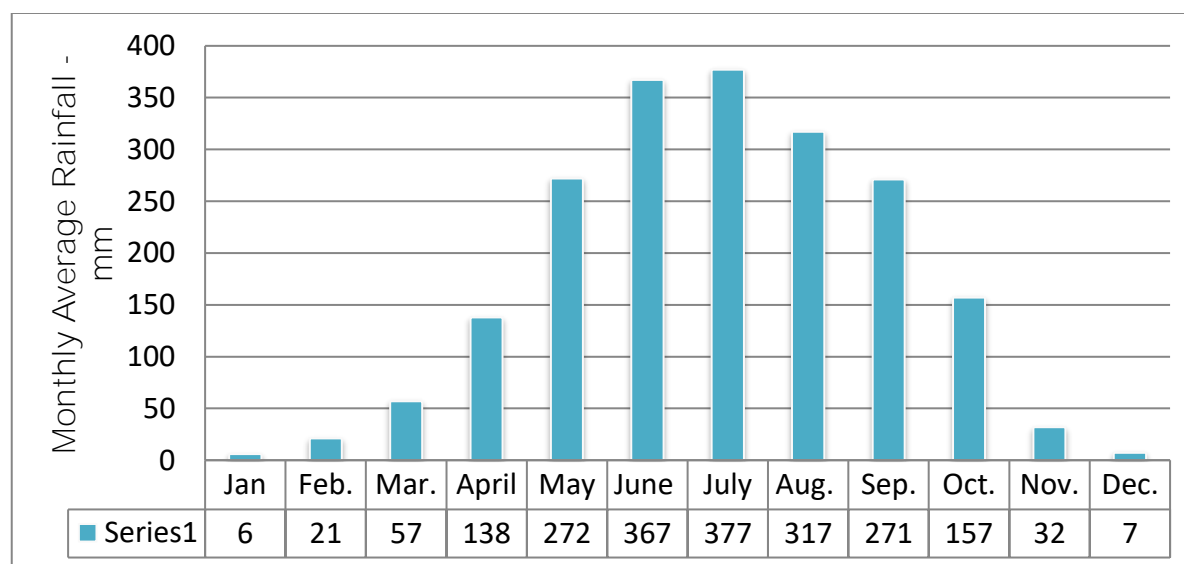


Figure 3.3: Average Rainfall in Dohar (Source: [www.weather and climate.com](http://www.weatherandclimate.com))

The fig 3.1, 3.2 and 3.3 reveal that the upazila has a tropical wet and dry climate characterized by monsoon high temperature, considerable humidity and rainfall. Average temperature is 26⁰ C. Hot season commences early in April and continues up to July. Rainfall ranges from 6 mm in January to 377 mm in July with annual rainfall of 2022 mm.

Bio-diversity: In a rural natural setting, the countryside of the upazila exhibits an excellent biodiversity with the intermingling of green crop field, river water, diverse variety of flora and fauna including varieties of trees and vegetation,

In a rural natural setting, the countryside of the upazila exhibits an excellent biodiversity with the intermingling of green crop field, river water, diverse variety of flora and fauna including varieties of trees and vegetation.

3.2 Land and Soil

3.2.1 Land Resources in Dohar

Total lands in the upazila stands at 16149 hectares. Net cultivable land is 9216 hectares and total cultivated land is 7439 hectares.

In general, the upazila is dominated by medium lowland (2624 ha) followed by medium highland (2333 ha). The upazila is moderately suitable for high value crop cultivation highly suitable for rice cultivation as indicated by higher percentage medium lowland the distribution of agricultural land types by union is given in Table 3.1.

Table 3.1: Land Type of Cultivable Area of Dohar Upazila

Union	HL	MHL	MLL	LL	VLL	BL	Total
Bilashpur	0	180	162	400	165	5	912
Kushumhati	0	127	340	450	270	150	1337
Mohamudpur	75	250	528	150	150	100	1253
Mukshudpur	0	640	255	20	5	10	930
Narisha	140	160	450	250	62	0	1062
Nayabari	50	100	350	450	5	4	959
Roypara	180	130	240	160	4	0	714
Sutarpara	50	80	250	730	10	9	1129
Municipality	50	180	450	200	40	0	920
Total	545	1847	3025	2810	711	278	9216

HL- High Land; MHL- Medium High Land, MLL- Medium Low Land, VLL- Very Low Land, BL- Bottom Land

Source: DAE, 2016

a) Hydrology and River Hydraulics

The hydrology of Dohar is determined by the rainfall that occurs annually and the river system of the upazila. The mighty Padma River flowing by the south-west of the upazila is the main determinant of the upazila surface hydrology apart from rainfall. Almost all the rivers used to over flow and submerge the plain lands during monsoon. But with the climate change most rivers do not overflow now, as water does not flow through the rivers as it used to earlier. Besides, erection of Bundh on the Padma has stopped flooding in most riverbank areas.

b) Agro-Ecological Zones

The upazila is covered by three Agro-ecological Zones (AEZs). These are AEZ-10: Active Ganges Floodplain, AEZ-12: Lower A Ganges River Floodplain and AEZ-15: Aerial Beel. Active Ganges Floodplain occupies 4150 hectares of unstable alluvial char lands with irregular relief of broad and narrow ridges and depressions, interrupted by cut-off channels and active channels. Both the outline and relief of char formations are liable to change each flooding season due to bank erosion by shifting channels. Local difference in

elevation are mainly 2-5 meter. Seasonal flooding is shallow on ridges and moderately deep in depressions. Depression sites and thick new silty deposits stay wet through the dry season.

Low Ganges River Floodplain covers 2765 hectares of land having meander floodplain landscape of broad ridges and basins. It has also higher proportion of the land, less deeply flooded and drains early enough in the dry season to be usable for dry land rabi crops. It has somewhat irregular relief alongside rivers, crossing the region comprising broad and narrow ridges, inter-ridge depression and cut-off channels. Difference in elevation between ridge tops and basin centers are generally in the range of 3-5 meter. The highest part of the ridges stands above normal flood level, however, generally become wet during periods of heavy monsoon rainfall when the surrounding land is flooded and remain submerged for short period during exceptionally high floods. Adjoining middle parts of ridges are shallowly flooded at the peak of normal floods. The basins occupy greater portion of the landscape and are moderately to deeply flooded.

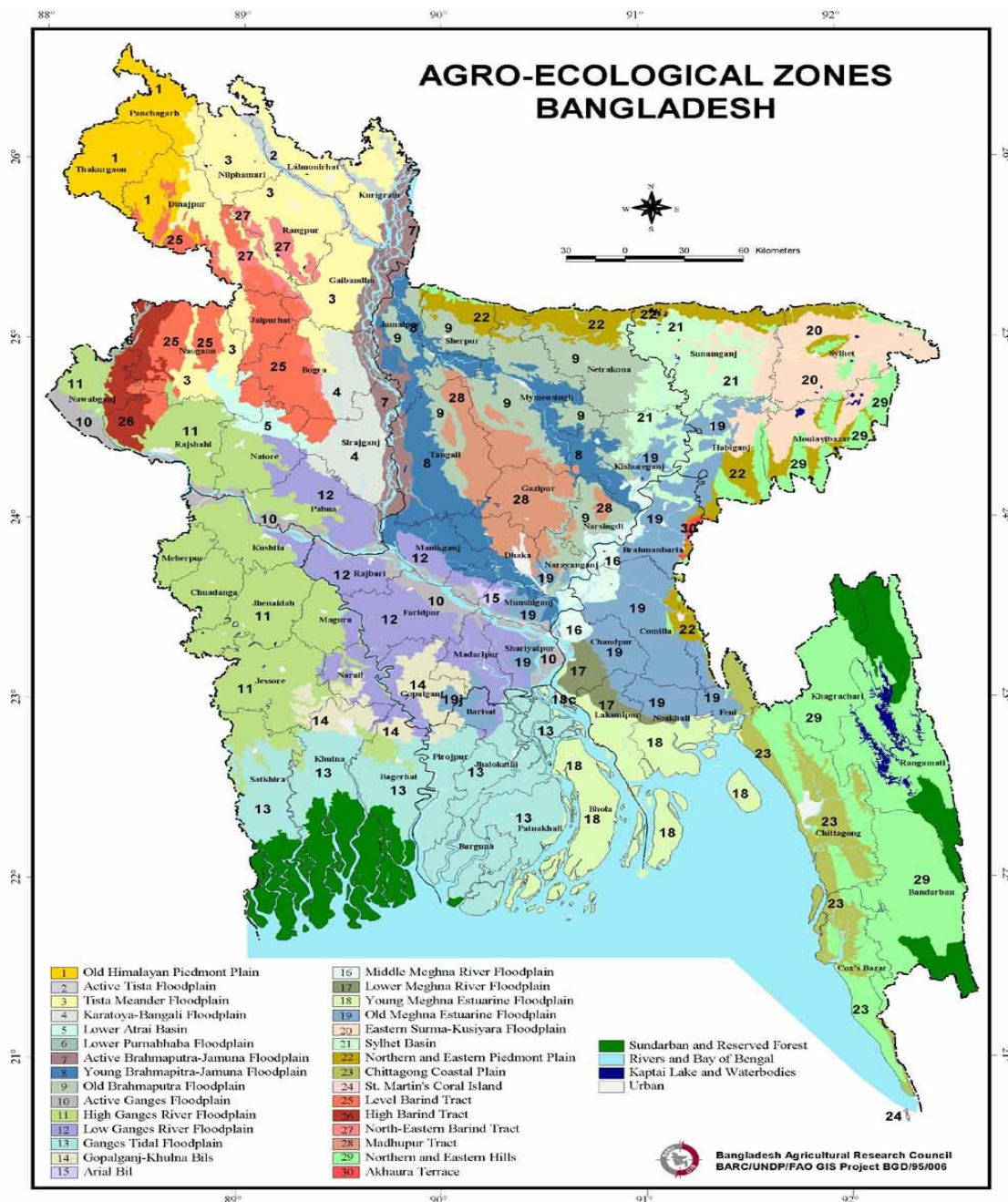
Arial Beel region covers an area of 949 ha occupies a low-lying basin between the Ganges and Dhaleshwari rivers in the south. Mainly deeply flooded in the rainy season. Basin centers flood early and stay wet for most or all of the dry season.

3.2.2 Soil Type

The soils in the Active Ganges Floodplain area has complex mixtures of calcareous sandy, silty and clayey alluvium. The general soil types predominantly include Calcareous Alluvium and Calcareous Brown Floodplain soils, which are low in organic matter and mildly alkaline in reaction. General fertility level is medium. Soils of the Low Ganges Floodplain 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.

The soils of Arial Beel are dark grey, acidic heavy clays. Noncalcareous Dark Grey acidic and heavy clay soils predominate the region. Floodplain soils are the major general soil type. Organic matter content generally exceeds two percent in the top and subsoil. Available moisture holding capacity is inherently low. The general fertility level is medium to high. *Khals* crossing the area are tidal in the dry season and contain fresh water throughout the year.

Soil of Dohar comprises soil type that is slightly alkaline, slightly acidic to neutral. Top soils strongly acidic when dry and neutral when wet. The soil of the area is flooded 10-20 feet in the monsoon. However, erection of embankment it has stopped river overflowing in most areas. Some depressions are observed where water remains round the year. Most soils, however, dry up for at least a period during March-April.



Map 3.1: Agro-Ecological Zones of Bangladesh (Source: BARC)

3.2.3 Soil Nutrient Status

The soil nutrient condition in Dohar is moderate. Soil organic matter content is medium. Major plant nutrients- Nitrogen, Phosphorus content is low to very low and potassium content is medium in highland, medium highland and medium lowland. In low and very lowland nitrogen and phosphorus content is low to very low, but potassium content is moderate to very high. Micronutrient content is high moderate to very high but Zn is low to very low except very low land (Table.3.7).

Table 3.2: Soil Nutrient Status of Dohar Upazila

Land Type	Soil Texture	Cultivation Type	PH	OM	Nutrient Status										
					Ca	Mg	K ₂ O	N	P ₂ O ₅	S	B	Cu	Fe	Mn	Zn
HL	Loamy	Upland/Wetland	6.8-8.0	L	VH	M	M	VL-L	VL	H	M	VH	M	VH	VL
MHL	Loam/Clay Loam	Upland/ Wetland	6.3-8.0	M	VH	VH	M	L	VL	VH	A	VH	VH	VH	L-VL
MLL	Clay/Clay	Upland/ Wetland	6.9-8.0	M	VH	VH	M	VL-L	L	VH	A	VH	VH	VH	L
LL	Clay/Clay loam	Wetland/Upland	6.4-8.0	M	VH	VH	VH	M	VL	VH	L	VH	VH	VH	L
VLL	Clay	Wetland	5.4	M	VH	VH	VH	M	VL	VH	VL	VH	VH	VH	M

Note: A- Appropriate, VH- Very High, H- High, M- Medium, L- Low, VL- Very Low Source: SRDI, 2001

3.3 Land Suitability for Crop Production

The land may be considered in its present condition or after improvement. The land suitability classification indicates the relative suitability of land for sustained production of common agricultural crops and other uses such as fisheries, forest, urban and commercial areas adapted to the existing physical and environmental condition. The soil may likely to change land capability classes. In that respect land suitability classification is an economic evaluation of land.

3.3.1 Crop Suitability

For crop suitability of a land depends on its elevation, flooding depth, soil characteristics, land type and topography, hazards like erosion, drought and socio-economic interventions etc.

A crop suitability-rating table has been prepared using Upazila Land Use Report of SRDI, 2001. Four different categories of suitability have been used for land use:

1=suitable,2=Moderately suitable, 3= not suitable. A land is considered suitable for a crop when it is either in category 1 or in 2 and not suitable for 3. Attributes used for the assessment of physical suitability are shown in table 3.3.

Table 3.3: Soil Attributes for Suitability of Crop Production

Union	Area under Different Crops															Total
	Cereal Crops					Pulses	Oil Crops	Tuber Crops	Spices	Vegetables			Fruits	Jute	Sugarcane	
	Rice	Wheat	Maize	Other cereals	Total Cereals					Winter	Summer	Total Veg.				
Bilash pur.	458	0	1	0	459	98	197	7	32	39	58	97	16	8	1	915
Kushu mhati	825	6	0	0	831	194	194	3	196	25	0	25	52	0	0	1495
Mahm udupur	453	6	0	0	459	165	125	7	53	42	62	104	0	11	0	924
Mokse dpur	638	10	8	20	676	127	100	50	125	190	110	300	45	20	10	1453
Narish a	732	15	10	20	777	215	120	50	120	170	170	340	32	15	10	1679
Nayab ari	427	0	0	0	427	360	57	7	28	28	56	84	10	0	0	973
Roypar a	307	10	0	0	317	150	85	10	5	35	50	85	30	15	5	702
Sutarp ara	725	5	0	0	730	370	65	5	70	75	95	170	40	15	1	1466
Dohar Mun.	170	0	0	0	170	190	35	5	23	50	80	130	0	15	1	569
Total	4735	52	19	40	4846	1869	978	144	652	654	681	1335	225	99	28	10176

Note: 1= Suitable, 2= Moderately Suitable, 3= Unsuitable

Source: ভূমি ও মৃত্তিকা সম্পদ ব্যবহার নির্দেশিকা, দোহার উপজেলা, মৃত্তিকা সম্পদ উন্নয়ন ইনস্টিটিউট, কৃষি মন্ত্রণালয়, ২০০৯।

On the basis of AEZ characteristics and Land and Soil Utilization Guidelines” Developed by SRDI, 2001; observation, purposive visits and consultation with DAE as well as leading farmers crop suitability of Dohar upazila has been prepared (Table 3.4).

Table 3.4: Crop Suitability under Different Land Situation in Dohar Upazila

Land Type	Soil Type	Suitable Crops		
		Kh-I	Kh-II	Rabi
Leveled, Highland with early water receding	Loamy soil, moderately permeable with neutral to slightly alkaline soil reaction.	Maize, S. Vegetables	T.Aman, Black Gram, Vegetables	Wheat, Maize, Potato W. Vegetables Mustard, Water melon, Soybean, Sunflower
Leveled, Medium Highland; with early water receding	Loamy soil/Clay Loam/ Clay, moderately permeable with neutral to slightly alkaline soil	T.Aus, B.Aus, Sesame, Jute, Vegetables	T.Aman	Wheat, Mustard, Maize, Onion, Garlic, Chilli, Vegetables, Pulses
	Loamy, Permeable, slightly alkaline soil	B.Aus, Jute, Sesame	T.Aman	Wheat, Millets, Gram, Mustard, Grass pea

Land Type	Soil Type	Suitable Crops		
		Kh-I	Kh-II	Rabi
Leveled, Medium Low Land; with early water receding	Cly Loam/Clay	Aus Rice, Jute, Sesame, Millets	T.Aman	Wheat, Mustard, Gram, Grasspea, Boro
Leveled, Low Land; normal water receding	Clay, water recessin late, Slightly acidic to alkaline, impermeable	B.Aus	B.Aman	Boro/ Grass pea
	Neutral to highly acidic	-	B.Aman	Boro
Leveled, Very Low Land; with early water receding	Clay, late recession, impermeable, highly acidic	-	-	Local Boro
Slope, High Land; with early water receding	Loamy/Clay Loamy; Slightly impermeable	Summer Vegetables ,Aus rice, Jute, Sesame, S.Potato, Chilli, Brinjal	Blackgram, S.Vegetables, early winter vegetables, country bean	Maize, Mustard, Sesame, GroundnutWinter Vegetables, Chilli, Onion/Garlic Mung, Lentil
Slope, Medium High Land; water recession late		Sesame	-	Blackgram, Groundnut, S.Potato, Melon, Water Melon
Slope, Medium Low Land, water recession late	Sandy Loam/ Loam; slightly alkaline	-	B.Aman	Onion, Potato, Melon, Groundnut

3.3.2 Land Utilization Pattern

Table 3.4 reveals that, out of the total area 16149 ha 13537 ha (84%) is land area and 2582 ha (16%) is water area. Within the land area only 256 ha (2%) is under community forest, 1022 ha (6%) is urban area, 3074 ha (19 %) occupied by rural settlement and 9216 ha (57%) is cultivable area. Out of the total cultivable area 7439 ha (81%) brought under crop cultivation and only 1117 ha (12%) is used for non-agricultural purposes.

Table 3.5: Land Utilization Pattern by Union

Union	Total Area (ha)	Forest Area (ha)	Rural Settle ment (ha)	Urban Area (ha)	Culti- vable Area (ha)	Culti- vated (ha)	Perman ent Fallow (ha)	Land used for other purpose	Water bodies (ha)
Bilashpur	1100	10	73	5	912	902	5	5	100
Kushumhati	1782	5	250	10	1337	1158	50	129	180
Mohamudpur	4205	150	950	450	1253	753	350	150	1402
Mukshudpur	1300	10	250	10	930	905	15	10	100
Narisha	1762	10	250	15	1062	999	50	13	425
Nayabari	1409	0	340	10	959	866	40	53	100
Roypara	960	30	100	12	714	504	50	160	105
Sutarpara	1600	20	291	10	1129	979	50	100	150
Municipality	2031	21	570	500	920	373	50	497	20
Total	16149	256	3074	1022	9216	7439	660	1117	2582
%	100	2	19	6	57	46	4	7	16

Source: DAE, Dhaka District Statistics, BBS, 2011, Banglapedia

At individual level maximum 0.40 ha and minimum 0.01 ha of land are used for homestead. Area under perennial plants are maximum 0.61 ha and minimum 0.01 ha. and individual pond /water area is maximum .61 ha and minimum 0.01 ha.

Table 3.6: Individual Land Utilization Pattern of Dohar

Purpose	Land use pattern by individual household (ha)		
	Maximum	Minimum	Average
Homestead	0.40	0.01	0.07
Cultivable Land	2.47	0.02	0.75
Perennial Plants	0.61	0.01	0.16
Cultivable Waste	1.47	0.04	0.57
Pond/Water Bodies	0.61	0.01	0.14

Source: Household Survey, 2016

3.4 Growth and Decline of Cropland during Last 10 Years

Due to urbanization and rural settlement for increased population, infrastructure development and riverbank erosion total cultivated area declined at seven percent. Decrease in cultivated land is maximum in Naybari union (14 percent) followed by Bilaspur (10 percent). To combat the situation farmers are intensifying cropland use by producing more than one crops in a year (Table 3.7).

Table 3.7: Growth/ Decline of Cultivated Land in Dohar

Union	Total Cultivated Area (ha)			
	2005-06	2015-16	Growth/Decline (ha)	Growth/Decline (%)
Bilaspur	1002	902	-100	10% declined
Kusumpur	1208	1158	-50	4%declined
Mohammadpur	813	753	-60	7 % declined
Mukshedpur	955	905	-50	5%declined
Narisha	1049	999	-50	5 % declined
Naybari	1007	866	-141	14% declined
Roypara	534	504	-30	6 % declined
Sutarpara	1009	979	-30	3 %declined
Doh. Munici.	423	373	-50	12 % declined
Total	8000	7439	-561	7 % declined

Source: DAE, Dohar, 2016

CHAPTER-4: AGRICULTURAL PRODUCTION AND MARKETING SYSTEMS

4.1 Crop Agriculture

Crops are grown in almost 8040 hectares of land. Main crops of the upazila are boro paddy, aman paddy, potato, jute, mustard, and pulses. About 70 percent of the land of the upazila area is occupied by crop and intensively used for cultivation (DAE, Dohar, 2016). Due to dominance of medium low land, cropping intensity during summer season is comparatively less than winter. During winter, the crop fields are covered by multiple crops and give a refreshing view.

Main fruits are mango, guava, papaya, jackfruit, coconut, litchi, and banana etc. Tree farming is found in the raised border of land. Out of the total 23264 ha. net cropped area, 18 percent is single cropped, 66 percent double cropped, and 17 percent triple cropped. Land of the upazila is moderately fertile and cropping intensity is 199 %. The area is favorable and suitable for betel vine cultivation and other winter crops.

4.1.1 Farming Category

In Dohar upazila small and marginal farmers (Marginal 42% and Small 31%) dominate the farming community. About 13 percent farmers are landless. About 14 percent farmers (medium-11% and Large -3%) are economically solvent. Out of 55856 farm families, 17175 (31 percent) are tenant farmers (DAE, Dohar, 2016). Small and tenant farmers are resource poor and invest less in the farming and are not able to harvest potential yield of the crops and crop varieties. Due to poverty the farming, practices are mostly subsistence in nature and produce minimum marketable commodities.

Table 4.1: Farm Category in Dohar

Union	Category of Farm Family (%)					Total
	Land Less	Marginal	Small	Medium	Large	
1. Bilashpur	320	1370	800	460	60	3010
2. Kushumhati	200	707	1505	520	32	2964
3. Mahmudpur	240	700	900	350	25	2215
4. Moksedpur	675	1363	910	313	125	3386
5. Narisha	482	1810	1080	390	70	3832
6. Nayabari	350	750	860	270	80	2310
7. Roypara	196	678	363	135	21	1393
8. Sutarpara	500	670	760	250	70	2250
9. Dohar Mun.	1187	1709	407	138	13	3454
Total	4150	9757	7585	2826	496	24814

Source: DAE, Dohar

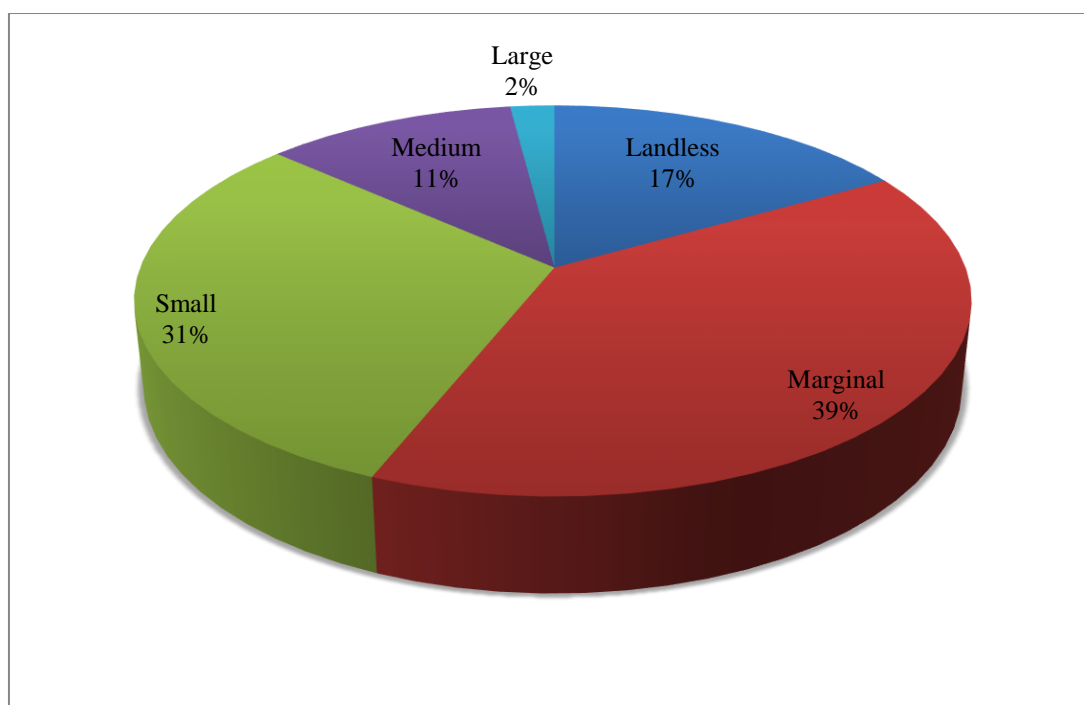


Figure 4.1: Farm Category in Dohar (Source: DAE, 2016)

As of the Population and Housing Census 2011, Dohar has a population of 226439 of which 107041 are males and 119398 are females. Population constitutes by males 47 percent and females 53 percent. Eighteen up population of the upazila is 136248 (The table 4.2)

Table 4.2: Population in Dohar by Union

Union	Area (ha)	No. of House-holds	Population					
			All ages			Age 18+		
			Male	Female	Both sex	Male	Female	Both sex
Bilashpur	1100	2898	6848	7420	14268	3498	4305	7803
Kushumhati	1782	4898	10482	11764	22246	6090	7717	13807
Mohamudpur	4205	3510	8207	8639	16846	4660	5134	9794
Mukshudpur	1300	5218	11039	12741	23780	5813	7877	13690
Narisha	1762	8537	18336	20693	39029	10211	13005	23216
Nayabari	1409	3279	6737	7446	14183	4072	4883	8955
Roypara	960	5496	11609	13379	24988	6917	8689	15606
Sutarpara	1600	7508	16048	18617	34665	8769	11645	20414
Municipality	2031	8056	17735	18699	36434	10892	12071	22963
Total	16149	49400	107041	119398	226439	60922	75326	136248

Population Census 2011, BBS

4.1.2 Land Ownership

Farmers land ownership pattern as the household survey revealed that average farmers have total land less than one ha. with maximum 2.61 ha and minimum 0.07 ha. Own land is on average 0.39 ha. with maximum 2.39 ha and minimum 0.01 ha. Maximum leased in land is 0.97 ha. with minimum 0.08 ha and average leased area is 0.45 ha. Mortgage land area is maximum 5.26 ha with minimum 0.06 ha. The land ownership and mortgage pattern

indicate that most of the farmers are poor and big farmers are absentee who lease out or mortgage their cultivable land to landless or marginal and small farmers.

Table 4.3: Land Ownership Pattern of Dohar

Ownership	Land Area (ha)		
	Max	Min	Average
Own land	2.39	0.01	0.39
Leased in land	0.97	0.08	0.45
Mortgage in land	5.26	0.06	0.69
Total	2.61	0.07	0.82

Source: Household Survey, 2016

4.1.3 Major Crops Grown

The major crops grown in Dohar upazila are rice (boro, transplanted aman, transplanted and broadcast aus), jute (olitorious and capsularies), potatoes, mustard, sweet potatoes, pulses (lentil, gram, black gram, and white gram), oil crops (mustard, sesame) and vegetables. Rice is grown in three distinct growing seasons namely Aus (April- Aug), Aman (July–November) and Boro (December – May). Transplanted Aman is grown mostly under rain fed condition or with supplementary irrigation while Aus is scattered and cultivated in few areas of highland. Boro is the most important crop in Bangladesh for its huge production and high suitability. It can be grown in wide range of environment and mostly in all type of land. Wheat, potato, pulses and other winter crops are cultivated in rabi season. Clay soil is the best for rice cultivation due to its high water holding capacity. On the other hand, light textured soil with friable consistency is suitable for rabi crops. Major Crops grown in the upazila with estimated area are shown in the Table 4.4.

Rice: Rice is a primary crop and a staple food of this area Major rice grown in aman season. Boro rice cultivation expanding with the increase of irrigation facilities in the upazila. Productivity of rice increased due to technological breakthrough. At present rice grown in about 4736 ha of land and covers 46 percent of the cropped area.

Jute: Jute is the eco-friendly crop and increase soil fertility. However, area is only 99 ha and covers only one percent of the cropped area. This important crop is at the stage of extinction because of low productivity high production cost due to scarcity of labor, and defective marketing system. There is huge potentials of increasing both area and productivity of this valuable crop by increasing availability of quality seeds and accelerating specialized extension service and mechanized cultivation.

Vegetables: Vegetables grown both in winter and summer season are next important crops of the upazila. A good number of vegetables like brinjal, green chilli, are grown here all the year round. Table 4.4 shows that vegetables grown in 1335 ha of land of which winter vegetables coverage is 654 ha and summer and year round vegetables grown in 681 ha of land. Most of the rural households grow vegetables in the homestead areas. Area under vegetables cover only 13 percent of the total cropped area. Potentials exist to increase area and production of summer vegetables in the upazila by introducing modern techniques vegetables growing in marshy land and in waterlogged area.

Pulses and oil crops: Riverine floodplain dominant in the upazila with medium low and low land accompanied by calcareous soil made it highly suitable for pulses and oil crops

cultivation in the winter season. At present pulses and oil crops grown respectively in about 1869 ha. and 978 ha. of land. These crops occupy about 24 percent of the total cropped area. Introduction of modern varieties with improved cultural practices can increase pulses and oil crops production and productivity in the upazila.

Spices: Spices are the important rabi crops grown in Dohar upazila. Spices grown in about 652 ha of land and occupy about six percent cropped area of the upazila. Spices have bright prospect of growing in the upazila with modern techniques through organized farming approaches.

Tuber Crops: Potatoes and sweet potato are important tuber crops grown in only 144 ha. of land. Vitamin rich Orange Fleshed Sweet Potato if introduced through project support could contribute in reducing nutrient deficiency and food security of the rural community.

Table 4.4: Area (ha) under Major Crops in Dohar

Union	Rice	Wheat	Maize	Other Cereals	Total Cereals	Pulse	Oil Crops	Tuber Crops	Spices	W. Veg	S. Veg	Total Veg.	Fruits	Jute	Sugarcane	Total
Bilashpur	458	0	1	0	459	98	197	7	32	39	58	97	16	8	1	915
Kushumhati	825	6	0	0	831	194	194	3	196	25		25	52	0	0	1495
Mahmodpur	453	6	0	0	459	165	125	7	53	42	62	104	0	11	0	924
Meksedpur	638	10	8	20	676	127	100	50	125	190	110	300	45	20	10	1453
Narisha	732	15	10	20	777	215	120	50	120	170	170	340	32	15	10	1679
Nayabari	427	0	0	0	427	360	57	7	28	28	56	84	10	0	0	973
Raipara	307	10	0	0	317	150	85	10	5	35	50	85	30	15	5	702
Sutarpara	725	5	0	0	730	370	65	5	70	75	95	170	40	15	1	1466
Debar Man.	170	0	0	0	170	190	35	5	23	50	80	130	0	15	1	569
Total	4735	52	19	40	4806	1869	978	14	652	654	681	1335	225	99	28	10136

Source: DAE, Dohar, 2016

4.1.4 Cropping Pattern

Consultation with DAE field staff and local elite farmers disclosed the land based cropping pattern practices of the farmers of Dohar upazila. During Kharif-I jute dominate the cropped area when in Kharif-II aman rice is the main crop. Varieties of rabi crops like spices, pulses and winter vegetables grown in the upazila (Table 4.5). Improved cropping pattern including high value dry land crops like pulses, oil crops, spices need to be introduced through demonstration in the farmers' fields.

Table 4.5 Existing Cropping Pattern in Dohar

Land Type	Area(ha)	Existing Pattern		
		Kharif-I	Kharif-II	Rabi
High Land	2309	Fruits		
		Vegetables	Vegetables	Vegetables
		Turmeric/Ginger		
Medium High Land	2980	B.aman		Groundnut/mustard
		Vegetables	Vegetables	Vegetables
		B.aman	Fallow	Mustard-Boro
		Vegetables	Vegetables	Boro
		Chilli	Chilli	Chilli
		Jute	T.aman	Pulses
		Fallow	Fallow	Boro
Medium Low Land	2640	Fallow	Fallow	Boro
		Fallow	G.M	Pulses
		B.aman	Fallow	Mustard-Boro
Low Land	3140	B.aman	B.aman	Fallow
		Fallow	Fallow	Mustard-Boro
		B.aman		Boro
Very Low Land	1100	Fallow	Fallow	Boro (Local)
		Fallow	Fallow	Mustard-Boro

Source: Discussion with Field Extension Workers of Dohar, 2016

4.1.5 Cropping Intensity

Though dominated by medium low land the farmers of the upazila are producing multiple crops keeping pace with the market demands and family needs. According to the Department of Agricultural Extension, the cropping intensity of the upazila is comparatively lower than other areas of Bangladesh. Low lying landscape and improve drainage system impede the crop cultivation during summer months.

Table 4.6: Cropping Intensity in Dohar

Union	Cropping Intensity					
	Net Cropped Area	Single Cropped Area	Double Cropped Area	Triple Cropped Area	Total Cropped Area	Cropping Intensity
1. Bilashpur.	902	490 (54%)	322 (36%)	90 (10%)	1161	129
2. Kushumhati	1252	385 (31%)	735(59%)	173 (14%)	2374	190
3. Mahmudpur	753	341 (45%)	312 (41%)	100 (13%)	1265	168
4. Moksedpur	1363	407(30%)	342 (25%)	156 (11%)	1559	114
5. Narisha	1048	508 (48%)	693(66%)	165(16%)	2389	228
6. Nayabari	866	448(52%)	350(40%)	68(8%)	1352	156
7. Roypara	504	179(36%)	133 (26%)	92(18%)	721	143
8. Sutarpara	979	577(59%)	304(31%)	98(10%)	1479	151
9. Dohar Mun.	373	129(35%)	176(47%)	68(18%)	685	184
Total	8040	3464(43%)	3367(42%)	1010(13%)	12985	162

Source: Consultation Workshop with DAE, Dohar

Location near the Dhaka megacity, population pressure and rapid urbanization trends of the people accelerating rapid land use pattern negatively affecting agriculture in the

upazila. Cropping intensity has been calculated through consultation workshop with the field officials of the Department of Agricultural Extension, Dohar. Present cropping intensity is around 162 percent. Highest intensity (228 %) recorded in Narisha and lowest (114 %) in Bilaspur union (Table 4.6 and Fig. 4.2).

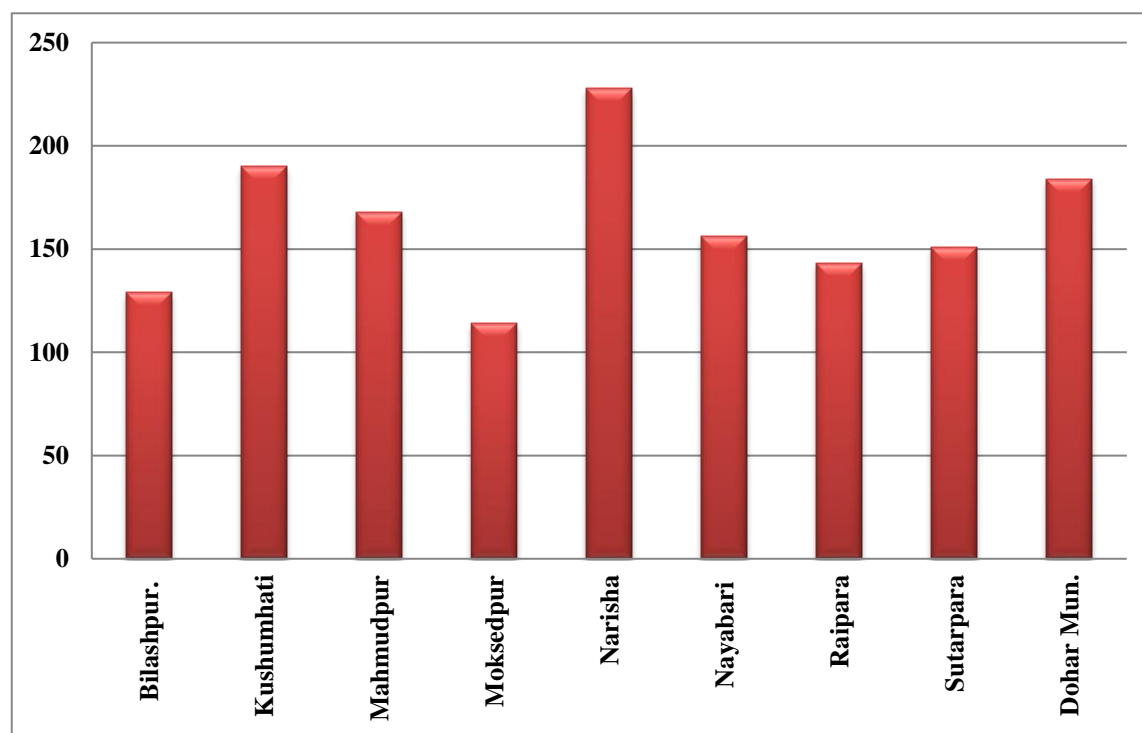


Figure 4.2: Cropping Intensity in Dohar (Source: DAE, Dohar, 2016)

4.1.6 Input Supply Situation

Seeds, fertilizers, pesticides, farm machineries and equipment constitute the inputs necessary for crop production. Supply situation, price and quality of inputs affect farming practices, productivity and production of crop agriculture. Present status of input use in the upazila is presented in the following paragraphs.

Seed: Improved seed is one of the basic and most important input to increase production and productivity of crops. The crop production depends largely upon not only the availability quality seeds but also farmer's accessibility to them and the production and productivity of crops depends upon the use of quality seeds by the farmers. Varietal development and maintenance of foundation seeds, multiplication of improved or certified seeds, and an efficient distribution network are all important elements of a healthy and well-functioning seed sector. But seed sector in Bangladesh is characterized by dominance of the public sector, inaccurate demand estimation mechanism and limited capability of the private sector. Discussion with extension staff and allied farmers disclosed that 70-80 percent farmers use their own retained seeds, which are in most cases of low quality. Due to ignorance and lack of proper motivation, farmers also use loose seeds from the unscrupulous seed traders and are cheated. Only 15 to 20 percent seeds of rice and jute are supplied by BADC. Private seed companies market vegetable seeds. But in most cases these seeds are of previous years' retained one and are of less vigor resulting into less production. DAE through its seed production projects at farmers' fields are working on

capacity enhancement of quality seeds production and preservation as well as seed exchange.

Fertilizer: Most of the soils in the upazila have low reserves of plant available nutrient and cannot support optimum levels of crop productivity on their own. In addition, large areas also suffer from other soil related constraints, which reduce the availability of nutrients present in the soil for crop use. Among the soil nutrient deficiencies in the upazila, the most extensive and important are those of nitrogen, phosphorus and potassium. Farmers to improve the soil fertility use fertilizers, as carriers of essential plant nutrients. Discussion with different farmers and extension personnel as well as review of documents revealed that fertilizer rates applied by the farmers of Dohar are far below the recommended dose. Imbalanced or lopsided use of nitrogenous fertilizers causing soil nutrient depletion. Yearly chemical fertilizer use of Dohar as presented in the table 4.7 divulged that nitrogenous fertilizers are used more than 700 times than other type of fertilizers.

Table 4.7: Yearly Distribution of Chemical Fertilizers in Dohar Upazila

Fertilizer	Distribution (ton)	Use (ton)
Urea	3050	3369
TSP	600	600
MoP	400	400
DAP	250	250
Others	0	0

Source: Dhaka District Statistics - 2011, BBS

Irrigation

Irrigation is considered as one of the important inputs for crop production. Success in modern crop production highly depends upon fulfilling water requirement of crops at various stages of growth. Two major sources of irrigation utilized by farmers are surface water and ground water. Table 4.8 indicates that farmers are exploiting ground water than surface water. This may be due to availability of STWs at affordable prices; one pump can be used in several borings and privatization of the equipment.

Table 4.8: Irrigation Status in Dohar

Union	Cropp ed Area (ha)	Irrigat ed Area (ha)	Non- Irrigated Area (ha)	Commanded Area for Irrigation						
				Ground Water				Surface Water		
				DTW		STW		LLP		Other
				No	Area (ha)	No	Area (ha)	No	Area (ha)	Area (ha)
Bilashpur.	1161	460	701	0	0	162	458	2	2	0
Kushumhati	2374	496	1878	0	0	53	481	15	15	0
Mahmudpur	1265	400	865	0	0	45	400	0	0	0
Moksedpur	1559	1371	188	0	0	186	1363	2	8	0
Narisha	2389	730	1659	0	0	135	720	2	10	0
Nayabari	1352	342	1010	0	0	58	342	0	0	0
Roypara	721	305	416	0	0	45	265	5	40	0
Sutarpara	1479	720	759	0	0	134	720	0	0	0
Dohar Mun.	685	188	497	1	8	38	180	0	0	0
Total	12985	5012	7973	1	8	856	4929	26	75	0

Source: DAE, Dohar, 2016

Table 4.9: Household Utilization of Different Mode of Irrigation

Irrigation System	No of Household	Percentage
Deep Tube Well	4	1
Shallow Tube Well	212	48
Power Driven Pump	13	3
Diesel Pump	88	20
Electrified Pumps	116	26
Irrigation by Indigenous Method	7	2

Source: Household Survey, 2016

Mechanized Cultivation

Like other areas of the country, mechanized cultivation is gaining momentum in Dohar upazila. The main thrust of mechanization is to reduce dependence on human labour and draft / animal power to till soil, planting, intercultural operation, and harvesting. Mechanized cultivation attribute timely cultivation and thus increased cropping intensity, reduced yield losses and wastage and also reduce cost of production. Mechanization program of Government of Bangladesh with subsidy in fuel and electricity yielding positive results. Table 4.10 reveals that farm mechanization is still concentrated on ploughing. In Dohar upazila there are 344 power tillers covering an area of about 4677 ha of land and total 219 power threshers covering more than 4000 ha of land.

Table 4.10: Mechanized Cultivation Status

Union	Tractor		Power Tiller		Power Thresher	
	No.	Area Cover	No.	Area Cover (ha)	No.	Area Cover
1. Bilaspur.	0	0	34	458	19	458
2. Kushumhati	1	120	42	330	33	580
3. Mahmudur	0	0	15	340	12	200
4. Mukshedpur	0	0	46	350	38	590
5. Narisha	0	0	95	600	60	1200
6. Nayabari	0	0	28	866	10	100
7. Roypara	0	0	24	483	15	480
8. Sutarpara	0	0	50	850	25	500
9. Dohar Mun.	0	0	10	400	7	100
Total	1	120	344	4677	219	4208

Source: DAE, Dohar, 2016

Household survey conducted during 2016 revealed that about 1 percent household use bullock drawn plough and 93 percent prepare their land by power tiller (Table 4.11). The trend indicate that in respect of land preparation almost all farmers depend upon power tiller.

Table 4.11: Use of Farm machineries by Individual Farmer

Ploughing Method	Count	%
Plough	3	1
Power Tiller	249	93
Indigenous	13	5
Others	3	1

4.1.7 Food Security Status

Dohar upazila is deficit in food grain production. Annual food grain demand is about 33060 tons and annual production is 18814 tons. Total food shortage is about 14244 tons (Table 4.12). Other items of food have been excluded from the calculation. Among the unions, only Bilashpur is surplus when the rest unions and Dohar Municipality are deficit in food production. The annual food requirement has been calculated as per recommendation of Desirable intake (Gram per capita peras per DDP, 2013).

Table 4.12: Food Situation in Dohar Upazila

Union	Population	Food grain		
		Annual Food grain Requirement	Annual Food grain Production	Surplus/Deficit
Bilashpur.	14268	2083	2198	115
Kushumhati	22246	3248	685	-2563
Mahmudpur	16846	2460	1892	-568
Moksedpur	23780	3472	2682	-790
Narisha	39029	5698	3604	-2094
Nayabari	14183	2071	1676	-395
Roypara	24988	3648	1683	-1965
Sutarpara	34665	5061	3587	-1474
Dohar Mun.	36434	5319	809	-4510
Total	226439	33060	18814	-14244

Source: Calculation by the consultant

4.2 Fishery

The landscape of Dohar upazila comprised of the floodplains of Ganges and the Arial



Photograph 4.1: Small and Indigenous Fishes being marketed in Joypara Bazar, Dohar

Beel and posses potentials for inland fisheries. Pond culture, capture fisheries in beels, canals, dishes, etc. are common practices in the upazila. Most of the fisheries practices are traditional with a few improved carp poly cultures. A variety of species like telapia, catfish, singhi fish, koi fish species are also used in polyculture and monoculture systems. At present fish culture in the paddy fields are gaining popularity are gaining popularity in the upazila.

Fishing is the second important livelihood option for small and landless rural families. About 60 percent of the landless fishers' families took extensive fisheries as the livelihood options when 40 percent of them practice it as side business. About 20 percent marginal and 10 percent small farmers practice semi-intensive fish farming as principal occupation.

There are 1400 fishermen engaged in fishing as their livelihood and total area of capture and culture fisheries in the upazila in 1400 ha of land with annual production of 2024 tons when area under culture fisheries is 124 ha with annual production of 940 tons (Table 4.13).

4.2.1 Inland Aquaculture

Among various segments of the sector, the inland aquaculture experienced fastest growth mainly through the introduction of new technologies, species and intensification and improvement of farming particularly in pond aquaculture, all over the country.

4.2.2 Pond Culture

Pond fishery is very popular in the upazila especially for the year round Carp Poly culture, Carp Golda Poly Culture, monoculture and Cat Fish Culture for the major species of Rui, Catla, Mrigel, Silver carp, Big head Carp, Silver Carp, Common Carp, Kalibaus, Tilapia, Pangus, Koi, Golda, Singhi, Magur, Pabda and Gulsha. In the upazila there are 2622 ponds covering an area of about 440 ha. (District Statistics, 2011, BBS). (Table 4.13).

Table 4.13 Resource Based Fish Production in Dohar

Types of Water Body	Area (ha)	Production (ton)	% of Total Production
A. Closed Water Culture (culture Based)			
i) Ponds	67		
ii) Seasonal Cultured Water Bodies	57		
iii) Oxbow Lakes	-		
iv) Semi-closed Floodplain	-		
Total	124	500	46
B. Open Water Body (capture Based)			
i) Rivers and Estuaries	466		
ii) Beel	100		
iii) Baor	-		
iv) Floodplain	710		
Total	1276	584	54
Upazila Total	1400	1084	

Source: DoF, Dohar, 2016

It is shown in the Figure-4.3 that both inland open water and closed water fish production

decreased during last 10 years. Inland open water (capture) fish production reduced by 26 percent when inland closed water (culture) fish production reduced by 38 percent and total fish production reduced by 32 percent.

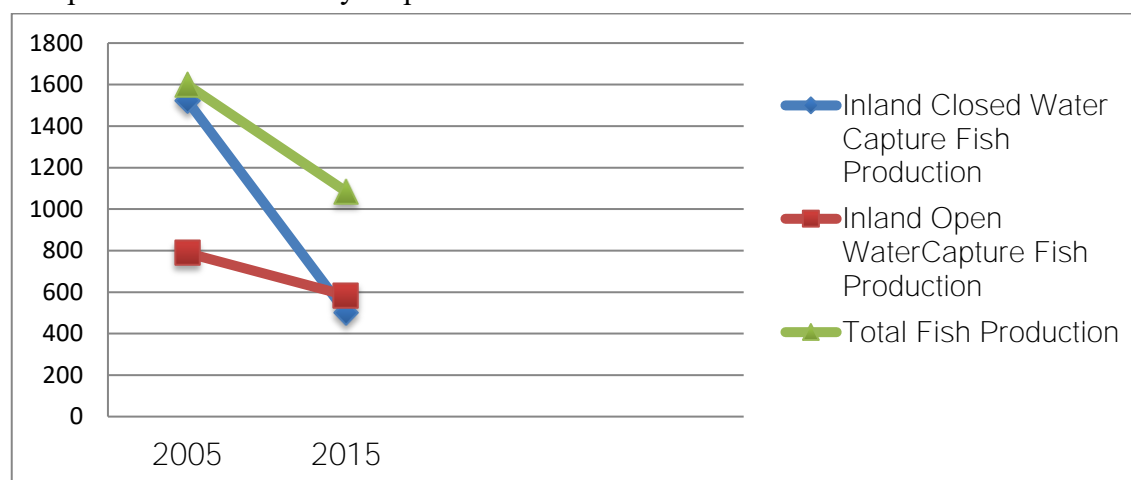


Figure 4.3: Trend of Fish Production in Dohar (Source: DoF, Dohar, 2016)

4.3 Livestock

Farming of cattle, buffalo, goat, sheep, etc., constitute livestock, an important sub-sector for the economy and food security of the poor people of Dohar upazila. This sub-sector plays a significant role in meat, milk and egg production. The char lands offer great opportunity for dry season cattle grazing. Poultry farming, especially, duck rearing is a common round the year practice.

Present status of livestock and poultry population has been provided in the Table 4.14. Dohar upazila mostly low-lying floodplain and there is huge scope of duck farming here. But duck population is only about 27944 Pigeon farming is another promising enterprise. As the area is famous for pulse production, commercial pigeon farming is possible here.

Table 4.14: Livestock Population in Dohar

Livestock	Farm Family	Number
Cattle & Buffalo	7409	18059
Goat	3102	6255
Sheep	170	6050
Cock & Hen	15012	75810
Duck	6006	27944
Others	970	10011

Source: Dhaka District Statistics-2011, BBS

Cattle and poultry farming are mainly concentrated as backyard farming practices. According to District Statistics, 2011, BBS more than 15000 farm families are engaged in backyard poultry farming and 600 families' rear duck. Commercial poultry farming is at growing stage.

Table 4.15. Livestock and Poultry Farming by Individual Farmer

Animal/Poultry	No. Reared/House		
	Max.	Min.	Av.
Cattle	12	1	3
Goat	14	1	5
Poultry	2	1	2

Source: Household Survey, 2016

Livestock Officer, Dohar there are 50 small scale and 248 big cattle farms and total population of cattle is 1510 in the upazila (Table- 4.16 and 4.17). There are 128 Beef Fattening Farms with total capacity of 640 cattle heads.

Cattle Farming: Small-scale dairy farming is becoming one of the best livelihood options for poor farmers in the upazila. According to Upazila Livestock Officer, Dohar there are 50 small scale and 248 big cattle farms and total population of cattle is 1510 in the upazila (Table- 4.16 and 4.17). There are 128 Beef Fattening Farms with total capacity of 640 cattle heads

Table 4.16: Small Scale Commercial Farming in Dohar

Dairy/Poultry	No. of Farms	Total Population
Cattle	50	250
Beef Fattening	128	640
Goat	50	150
Sheep	10	50
Chicken (Layer)	35	2450
Chicken (Broiler)	150	150000
Duck	10	5000

Source: DLS, Dohar, 2016

Poultry Farming: In Dohar upazila, commercial poultry farming is gaining popularity and emerged as an employment source for the job seeking unemployed educated people and women folk. At present, there are 195 small-scale commercial poultry farms and 207 dairy farms in the upazila (District Statistics, 2011, BBS).

Table 4.17: Large Scale Commercial Farming

Dairy/Poultry	No. of Farms	Total Population
Cattle	248	1240
Goat	111	830
Sheep	23	184
Chicken (Layer)	59	112252
Chicken (Broiler)	55	65600
Duck	5	818

Source: DLS, Dohar, 2016

Goat Farming: Commercial goat farming emerged as a profitable business model. Goats are small sized livestock animal and it is very easy to raise some goats by any rural household. Even the woman and children can also raise and take care of them easily along with their regular work. Commercial goat farming in the upazila is has not developed yet. Goats are reared in the backyard with grazing in the fringe land. According to DLS, Dohar there are 68 small-scale goat/sheep farms and 134 large-scale goat/sheep farms in the upazila.

Table 4.18: Growth/Decline Animal/Poultry during the Last 10 Years

Type	Total No. in 2005	Total No. in 2015	Growth/ Decline	% Increase of
Cattle	7000	12000	+5000	71%
Goat	1000	2500	+1500	150%
Sheep	800	1800	+1000	125%
Chicken	120000	152450	+32450	27%
Duck	1500	5000	+3500	133%

Source: DLS, Dohar, 2016

According to DLS, Dohar, livestock population in the upazila has been increased. Increment rate are- cattle 71%, goat 150%, sheep 125%, chicken 27% and duck 133%.

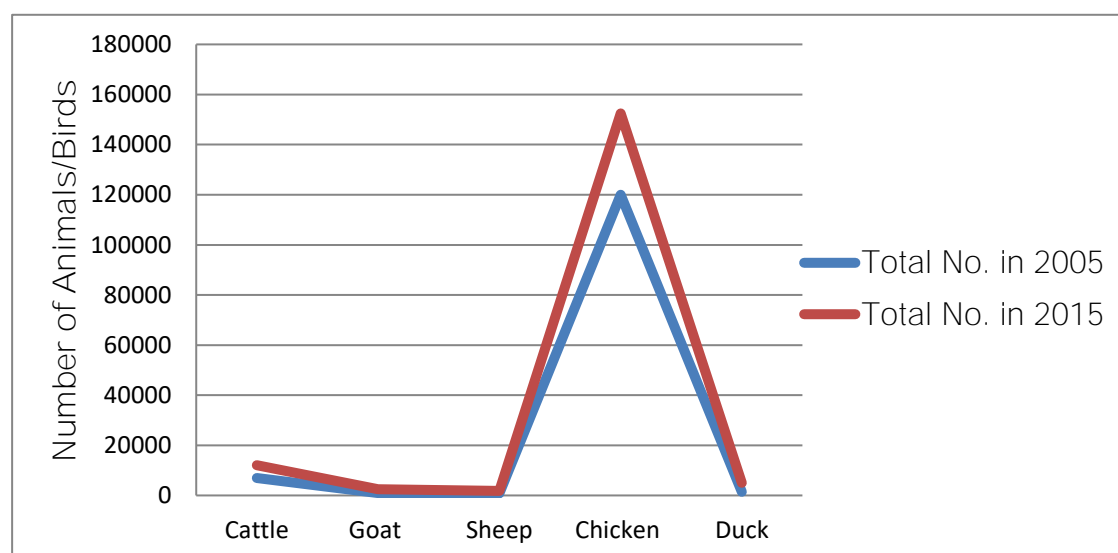


Figure 4.4: Trend of Increase/Decrease of Livestock population in Dohar Upazila

(Source: DLS, Dohar, 2016)

4.4 Forestry

There is no reserve forest under the management of Forest Department in the upazila. Vegetation in the homestead, public places, roadside popularly termed, as social forestry and vegetation in the crop field known as agro-forestry constitute the forestry sub-sector in the upazila. Total area of Dohar is about 15130 ha of which about one percent (154 ha) is under rural social forestry. Land types in the upazila vary from medium high to medium land. Rural settlement is established mostly in ridge area (highland) and medium highland and even in low land through raising mounds. The settlement area comprised of dwelling houses, ponds and vegetation from annual herbs to perennial shrubs and trees. Maximum forest area found in Mohammadpur, Raipur and Narisha unions (Table 4.19 and 4.20).

Table 4.19: Social Forestry in Dohar Upazila

Union	Total Area (ha)	Forest Area (ha)	% of Land under Social Forest
Bilashpur	1250	15	1
Kushumhati	1700	5	0
Mohamudpur	1300	35	3
Mukshudpur	1750	10	1
Narisha	2600	25	1
Nayabari	1680	0	0
Roypara	1600	30	2
Sutarpara	2250	20	1
Municipality	1000	14	1
Total	15130	154	1

Source: Consultation Workshop with DAE, Dohar Field Staff, 2016

Table 4.20: Rural Settlement Area in Dohar Upazila

Union	Total Area (ha)	Area Under Rural Settlement (ha)	% of Total Land
Bilashpur	1250	150	12
Kushumhati	1700	155	9
Mohamudpur	1300	250	19
Mukshudpur	1750	250	14
Narisha	2600	600	23
Nayabari	1680	540	32
Roypara	1600	500	31
Sutarpara	2250	500	22
Municipality	1000	150	15
Total	15130	3095	20

Source: DAE, Dohar and District Statistics, 2011, BBS

4.5 Marketing of Agricultural Commodities

Agricultural outputs markets in the upazila can be classified as primary market, secondary market and terminal markets. Usually large number of intermediaries operates in the agricultural markets. The primary markets are small local markets. These types of markets open usually twice a week. Petty traders, known as Faria, operate in these markets. They purchase directly from the farmers and assemble the produce. They perform some important marketing functions like sorting, grading, packaging and transportation. They sell outputs to the Beparis or whole sellers in the same markets or in the secondary markets at the upazila level. The secondary markets are situated in the upazila level; size of the market is much bigger than the local markets. Also number of sellers and buyers are large. Usually large number of Farias and Beparis operates in these markets and daily volume of outputs traded is also high. The Farias assemble outputs from surrounding villages.

Secondary markets are well communicated with district markets and terminal markets at Dhaka. In Dohar upazila, there are five growth centers and 35 established markets where agro-commodities are traded (DAM and LGED, 2016). Out of these 26 markets have necessary infrastructure for cleaning and grading of agro-commodities (Table 4.21).

Table 4.21: List of Markets and Growth Centers by Union

Union	Name of the market
Bilaspur	1.Majirchar Bazar
Kushumhati	2.Bangla Bazar, 3.Kartikpur Bazar
Mohammadpur	4.Mainat Bazar, 5.Harichanda Bazar
Muksudpur	6.Pallibazar, 7.Mukshudpur Bazar, 8.Fultola Bazar,
Narisha	9. Narisha Bazar, 10. Haller Bazar, 11. Meghula Bazar, 12. Satbhita Bazar, 13. Narisha Pachim Bazar
Naybari	14. Padmagonj, 15. Aurangabad Bazar, 16. Brama Bazar
Roypara	17. Boubazar, 18.Kacharighat Bazar, 19. Padmagonj Bazar
Sutarpara	20. Banaghata Bazar, 21. Alamin Bazar
Municipality	22. Joypara Boro Bazar, 23. Dohar Bazar, 24. Dhoair Bazar, 25. Natun Bazar, 26. Shaheb Bazar

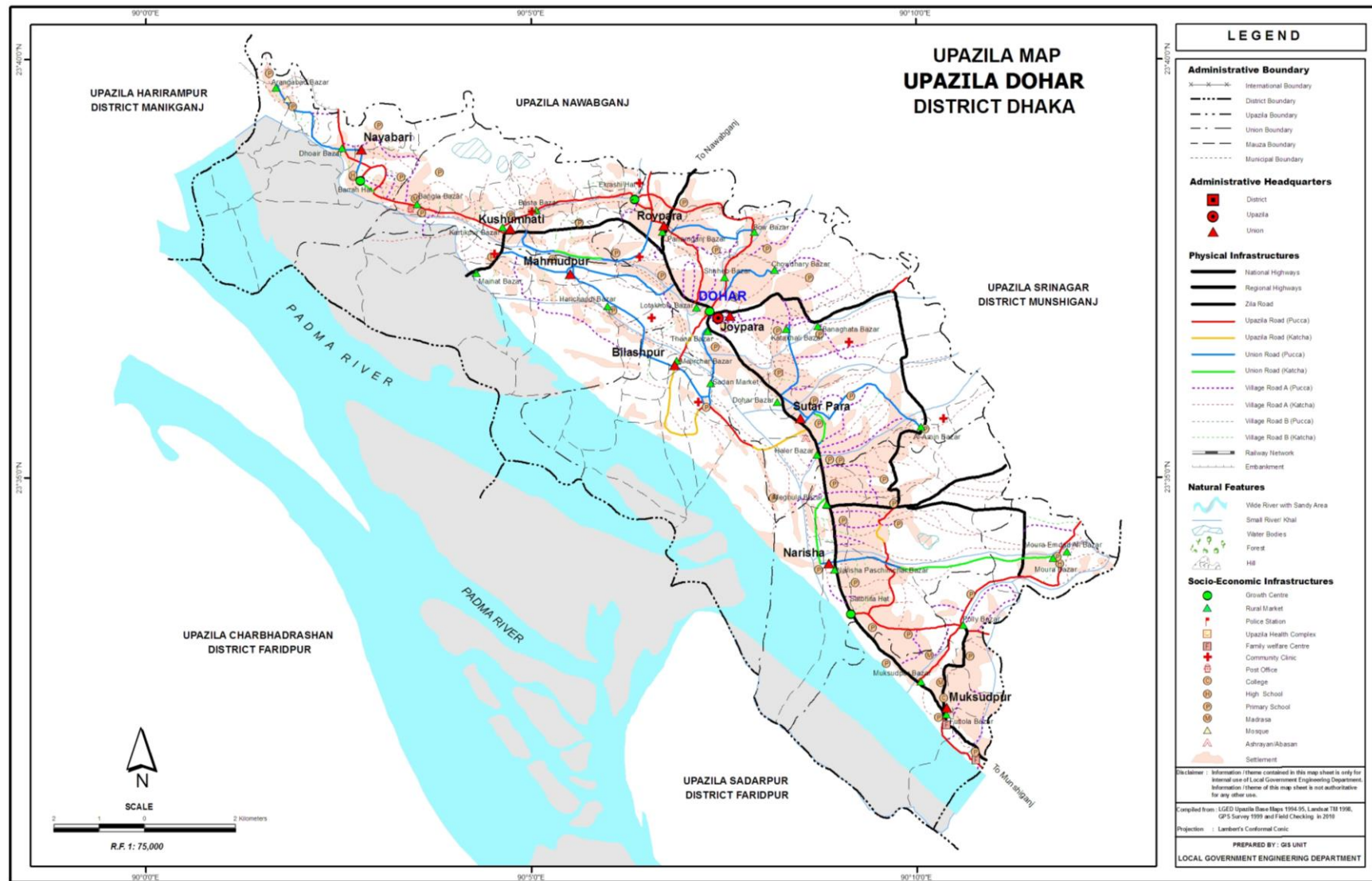
Source: DAM, LGED, 2016

Table 4.22 shows that farmers are incurring maximum profit from crop, livestock and fisheries (BDT-15000.00) when poultry farming is running on average at no loss no gain basis.

Table 4.22: Household Income from Agriculture

Item	Expenditure (thousand)			Gross Income (thousand)		
	Max	Min	Weighted Average	Max	Min	Weighted Average
Crop	50	10	33	50	10	48
Poultry	50	10	35	50	10	35
Livestock	50	10	27	50	10	42
Fishery	30	10	18	50	10	33

Source: Household Survey, 2016



Map 3.2: Markets and Growth Centers in Dohar

CHAPTER-5: CHALLENGES CONFRONTING AGRICULTURE

5.1 Crop Agriculture

Despite favorable agro-climatic condition, crop agriculture of the upazila is confronting various natural and manmade challenges. These are,

- Low level of soil fertility,
- Lack of capital for investment in farming,
- Lack of farmers' access to technologies,
- Farm labor crisis, and finally,
- Lack of incentives due to improper marketing facilities.

Major constraints are discussed in the following sections.

5.1.1 River Bank Erosion

Riverbank bank erosion is the topmost problem of land degradation of the upazila. This is the most common geomorphologic process played by the river Padma and the Arial Kha. Erosion depends on type of flow, channel geometry, topography, vegetation and its variation with time and space. Riverbed depth gradually decreases due to accumulation of eroded materials from the upstream accelerate flood and riverbank erosion. Bank erosion



Photograph 5.1: The River Padma Continuously Eroding Bank and devouring land and houses on its belly

and channel shifting of the untrained rivers are big problems to the local socio-economy and environment. It has a widespread effect on human settlement and agricultural land. There are displacement and socio economic impact due to riverbank erosion. When floods hit or the embankment erodes, people face severe problems. PRAs conducted and informal and formal discussions with local people and representatives of service providing agencies revealed that the unions situated partly or entirely on the bank of the mighty river Padma are prone to riverbank erosion. Every year hundreds of families' loss their valuable household assets, lands and livelihood due to bank erosion, result into migration to other places or in urban areas. Most affected unions are Mukshudpur, Narisha, Bilashpur, Mohamudpur and Sutarpara.

5.1.2 Drought

Absence of rainfall for a prolonged period is drought. It is a climatic change induced natural disaster in Dohar. It occurs when rainfall is absent for a prolonged period, causing earth to parch, wells to dry and underground water to fall. Other climatic factors such as high temperature, high wind and low relative humidity are often associated with drought. Drought prevails here in the pre-monsoon (March-May) period. Wide ranges of agricultural crops grown in the rabi and pre-kharif seasons become vulnerable to drought at varying degrees.

5.1.3 Monsoon Flood

Annual flooding during monsoon is common in the floodplains like Dohar. Occasionally, it becomes highly devastating in the area. Due to siltation, discussed in the previous section, reduces the drainage capacity of the rivers and canals and the narrow outlet created by siltation prolong the duration of flooding. Devastating floods occur in 2/3 years' interval. Prolonged flooding has negative impacts on crop, livestock and fisheries.

5.1.4 Water Logging

Water logging is one of the major problems of Dohar Upazila. Main cause of water logging is the siltation in the natural waterways. Lowlands are usually being flooded in the early monsoon. Due to inadequate drainage system, and or silted up of drainage channels or illegal encroachment by the influential persons for their interest, water cannot move out. As a result, the low laying areas of the upazila remain inundated for three to four months in the monsoon season. Other causes of water logging are human interventions like, construction of embankments, unplanned housing, and construction of village road networks. Moreover, the problems become acute when people have a common tendency to encroach and/or blocking the waterways for making houses, shops or fish culture etc. Localized drainage congestions are reported throughout the upazila but the level and duration of drainage condition depends upon various factors. Water logging usually remain confined to medium low land to low land areas. In addition to the damage of agricultural crops, drainage congestions affect transportation system. Additionally, it affects surface water quality, causing spread of water borne diseases and other health hazards. Water logging is a acute problem of Dohar Paurashava (Ward 1, 2 and 5), and in Kushumhati, Sutarpara, Narisha, and Muksudpur unions.

5.1.5 Brick Fields in Agriculture Land

Brickfields are known to be leading cause of land degradation. Rapid urbanization increases demand for brick and people are establishing brickfields in medium high agricultural lands near the roads. These are fertile lands capable of growing 2-3 crops in a year. Operation of brickfields in the agricultural land is carried out through collecting soils from a depth of about 1- 2 meter from agricultural land. Brickfields in Dohar is degrading topsoil and polluting environment. Emission of huge quantity of toxic elements from brick kilns is causing serious health hazards. The brick kilns emit toxic fumes containing suspended matters rich in carbon particles and high concentration of carbon monoxides and oxides of sulphur that are harmful to eye, lungs and throat, which stunt the mental and physical growth of children. A significant amount of wood of this upazila is used for burning bricks every year, causing deforestation. Brick burning not only alters the physico-

chemical properties and habitats of the nearby soils but also contributing to the pollution of environments and ecosystems. The topsoil nutrient elements and soil biota are destroyed through brick burning. Brick burning also increases the concentrations of greenhouse gases in the atmosphere. Evolved heat damages the forest and vegetation surrounding the brickfields and ultimately degrades the natural ecosystem. Smoke, dust and heat generated from the brickfields operation are the major issues of environmental hazards. Smoke and dust pollute the air of the surrounding areas that affect human settlements, educational institutions, office, market places, etc. There are seven big Brick Klins in the upazila (BBS,2011).

5.1.6 Expansion of Settlement, Infrastructure and Industries

Majority of the agricultural land in Dohar Upazila is medium and medium lowland those are suitable for single or double crops. But due to increased population, these fertile lands adjacent to roads are being converted into settlement areas, industries, hat-bazar, road etc. These unplanned developments of roads and infrastructures are gradually being developed everywhere within the upazila. The people are neither aware of planned township nor they care the future consequences of land loss for food security of the next generation. These sort of human interventions are aggravating waterlogging situation. Rapid and unplanned expansion of housing has been considered as one of the great challenges for sustainable agricultural production including the homestead forest. So, increased demands of housing and settlement, infrastructure, industries etc. are reducing the area of agriculture land. It threatens the ecological balance and leads to environmental degradation.

5.1.7 Improper Agricultural Practices

Majority of the people of Dohar are engaged in farming and earn food and income from agriculture and natural resources. But to grow more crops from fewer areas farmers are practicing high yielding technologies in inappropriate way. Many traditional crop varieties are either disappeared or in the verge of extinction. In addition, the practice of mono cropping has caused serious deterioration of soil characteristics and a decline in soil fertility as well as productivity. There are also competing demands on land for nonagricultural uses.

5.1.8 Improper Use of Fertilizer and Agrochemicals

Although fertilizer is one of the most important agricultural inputs to increase crop production, the soil health has deteriorated in recent years due mainly to imbalanced use of fertilizers. In our condition, urea is used in disproportionate dosages, while the other fertilizers like TSP & MoP are used in much lower dosages than the requirement. This imbalanced use of chemical fertilizers is mostly due to a lack of appropriate knowledge of the farmers for cultivation of different crops, non-availability of site-specific soil fertility information and high prices. Sometimes, unavailability of required fertilizers during peak demand periods and their defective distribution system impeded the use of fertilizers in required quantity.

As proper pest management is a contributing factor for increasing production, the availability and proper use of agro-chemicals are also important area of consideration. Pesticides of all types are available but there is a marked lack of quality control. Consequently, excessive and haphazard use highly poisonous pesticides deteriorating quality of food crops as well as the environment. Farmers are using chemical fertilizers

and poisonous chemicals for pest control. In most cases, farmers do not follow recommended doses. Indiscriminate use of chemical pesticides and excessive use of chemical fertilizers increase water pollution cause declining the aquatic bio-diversity.

5.1.9 Supply of Poor Quality Seeds

The availability of quality seed is far from satisfactory level. It is estimated that only 5% of the seeds used in the region are of good quality. People involved in agricultural business agree that the seed issue is also to a larger extent a question of quality. Stagnation or decline in the yields have been partly attributed to the fact that farmers use too much retained seeds from earlier harvests rather than renewing the seed and also that many modern varieties are losing their vigor. From the farmers' point of view, there is no efficient seed control and certification machinery in force. Seed situation is another serious constraint on raising yields.

5.1.10 Degradation of Wetland Ecosystems

Wetlands are among the productive and economically valuable ecosystems. Wetlands prevent flooding by holding water mass like a sponge. It holds water during monsoon and releases in drought. Both natural factors and manmade unplanned interventions are mainly responsible for the degradation of terrestrial and aquatic ecosystems. Due to tremendous pressure of population with limited economic resources, the ecosystems have gone under modification and alteration by human activities at various levels. The major elements of destruction are siltation, building infrastructure with inadequate drainage facilities, destruction of forest, wetland filling, improper fishing practices, water hyacinth, drying up of wetlands etc. In addition, people are converting low lying areas of the upazila for multipurpose commercial use, filling up fertile lands to build housing and similar other activities. This illegal practice is degrading the nature of wetland ecosystems. Narisha, Bilaspur unions are affected by the practice.

5.2 Fishery

5.2.1 Siltation of Riverbed

Over a few decades, significant changes in physical features and ecology have taken place due to siltation of riverbeds. This has a negative impact on the resource base and livelihoods of wetland resource dependent people. Unplanned construction of communication structure like roads, culverts, embankments, flood regulators, etc. have caused barrier to natural water flow of the rivers and canals creating water logging in the beels and floodplains and enhances silt deposition. As soon as the beels are silted up, the conjunctions of the rivers/canals mouth are also raised rapidly resulting the destruction of the connectivity between rivers/canals and beels. This is how the water is logged at various locations. Thus, the water areas have been reduced and affected the aquatic fauna and flora especially the fisheries resources. As a result, migratory routes of the fish and other aquatic animals have been seriously disrupted causing loss of aquatic habitats and its resources. Beds of the Padma River and canals have been silted up that reduced water carrying capacity of rivers. So, the excessive load of sediment deposited in the Arial Kha River and their tributaries causes flooding during monsoon and deposits sediments in adjacent low lying areas including agricultural land, lower depressions and wetlands of the upazila. During prolonged flooding of 1988, 1998, 2002 and 2004, there were huge depositions of sediment on agricultural land that damaged the crops and lost fertility of the soil. Almost

all unions of Dohar Upazila were affected by different degrees of siltation. The trend of reduction of the beels/water bodies was found to be similar at different places with negligible exceptions.

5.2.2 Catching of Brood Stocks and Juveniles of Hilsa

The Jatka is the juvenile form of Hilsa fish. The biology and ecology of the Jatka are distinct from the adult Hilsa. Conservation of Jatka is important, as juvenile species should not be fished before they reach maturity. Removing the fish before breeding age prevents reproduction processes, and therefore reduce continued growth of the Hilsa species. Economically, Jatka are smaller, therefore, has considerably less market value too. It migrates into the Padma River and its tributaries from the Bay of Bengal for breeding and nursing. Man-made influences, river siltation, closure of migratory routes, over-fishing, uses of damaging fishing gears, pollution, hydrological and climatic changes are responsible for the decline of Hilsa fish. Hilsa have significant ecological, economic and cultural importance, and are currently the focus of conservation efforts to preserve the sustainability of the fisheries.

5.2.3 Loss of Biodiversity

Dohar upazila is rich in biodiversity. But due to both natural and manmade factors like siltation of water channels, abuse of wetlands and disruption of aquatic network by constructing unplanned roads, embankments, expansion of housing and blocking of water channels, etc. the abundance and diversity of extremely valuable open water fisheries resources of this region are in declining trend. On the other hand, polluting the open water by runoff coming from over doses of fertilizers and pesticides/insecticides in the agricultural land etc. greatly influence the degradation of the aquatic environment and its resources. Indiscriminate using of destructive fishing gears like set bag net and current net, wetlands declined due to irrigation, destructive gears, industrial effluents, increased population, unplanned interventions for spawning & nursing and vice versa. Almost all the unions and the Dohar municipality is more or less affected by bio-diversity loss phenomena.

5.3 Livestock

Livestock and poultry sub-sector is constrained by a number of factors. Substandard feeding and improper management practices negatively affecting the productivity of the sub-sector. Furthermore, the syndicate of feed traders and market actors negatively affecting the sub-sector.

5.3.1 Technical and Management Problems

The livestock of the upazila suffers from some technical and management problems as follows.

- i) Most small farmers lack financial resources to establish dairy, poultry units. Absence livestock production-related extension service (e.g., upazila-level livestock service is limited to mostly clinical veterinary services, and a limited breeding service is available).

- ii) Unavailability of high growth rate and high meat yielding beef cattle/ doe for fattening. Farmers are mostly unaware of semi-intensive system of goat production.
- iii) Poultry farmers lack technically skilled manpower, shortage of quality chicks/ breeding materials,

5.3.2 Inadequate Coverage of Animal Health Service

The ratio of veterinary surgeons to farm animal and poultry is as low as 1/100,000 for livestock and 1/2,000,000 for poultry. The problem is again aggravated with poor transport network leaving 80 percent of the farmers outside of veterinary service. Only about 15-20 percent of farm animals are occasionally vaccinated. Private sector investment in the animal health sector remains low and is unlikely to expand in the future, unless provided adequate policy support and extension service. While the quality and quantity of vaccine, medicine and veterinary service delivered by the DLS are inadequate, the private sector is not coming up. There is no independent authority to check the quality of domestically produced or imported vaccine, medicine, feed and other inputs and there are no provisions for control of movement and quarantine during disease outbreak or epidemics.

5.3.3 Scarcity of Feeds and Fodder

Acute shortage of feeds and fodder is one of the single most important obstacles to livestock development in Bangladesh. Feed resources for livestock are primarily derived from crop residues and by-products such as straw, grass and tree leaves. Supplementary and concentrate feed are provided rarely and inadequately. This has resulted in stunted growth, reproduction and reduced productivity. Most of the dairy, poultry and fish farmers are facing the problem of adulterated and inferior quality of commercial feeds and feed ingredients. Feed labeling and control is inadequate. Most feed millers do not disclose the necessary information on the packaging concerning feed composition, ingredients, date of manufacturing, date of expiry, storage guidelines, energy levels, and protein and vitamin contents. Further, poor packaging causes quicker spoilage and deteriorating quality and threatening livestock, fish and human health. High price of feeds and fodder are also a problem for the smallholder livestock and fish farmers.

5.4 Marketing of Agro-commodities

5.4.1 Crop

Lack of organized market for selling farm produce is a problem for the upazila. The salient features of agricultural product markets are poor infrastructure, lack of cool chains, inadequate transports, storage and processing facilities, poor local roads and communication system, unfair practices of intermediaries, etc. The marginal and small farmers are often facing problem of marketing their products and are not getting fair price due to existence of trade syndicates.

5.4.2 Supply Chain Management of Fisheries

Although aquaculture production has experienced remarkable growth recently, a business-friendly supply chain still lagging behind. Due to long and complex marketing system, producers are not getting proper price for their farm products, where consumers are paying more. Fish and fish products are most perishable ones, and dearth of physical facilities and

infrastructure necessary for postharvest management of fish and fish products in the upazila affecting the sub-sector.

5.5 Agriculture Related Problems as Found from PRA

River Bank Erosion: PRA results revealed that as a riverside upazila, Dohar is badly affected by riverbank erosion. The mighty river Padma almost every year engulf villages, settlements, and bazars located by the riverbank in the monsoon season. Every year hundreds of rural families those who are living by the river bank and are comparatively poor loss their household belongings with lands and after losing everything they migrate to other places or in urban areas to live on seasonal labor or depends on begging for their survival.

Waterlogging: Chronic water logging emerged as a major problem for crop production in the unions situated on the bank of the river Padma and Ichamati. Participants in the PRA opined that water logging problem arises mainly because most of the canals, drainage channels and low lying areas have either been silted up or been illegally occupied by influential people for serving personal interests. The problem of water logging is more acute in monsoon when water accumulated due to heavy rains and cannot recede quickly because of obstructions in the water channels.

Poor Road Communication: Poor road communication in almost all unions is affecting transportation of agricultural inputs and outputs. Poor communication increases cost of production in one hand and on the other hand the poor farmers are not getting proper prices of their products.

5.5.1 Problem Identification

PRA participants identified of problems of their respective union. Table-2.1 shows, a variety of major problems have been identified by the PRA participants of 19 unions of the upazila (Table 5.1). Though problems vary from union to union, some are common for all unions. Agriculture practices of almost all unions are mostly traditional. Farmers do not get quality seeds in time and due to bad road communication, fertilizers are sometimes become scarce in supply and prices become high. Due to bad road communication, they face troubles in transporting agro-commodities to the market. Lacks of bank branches in the remote markets impede their access to rural credit. Unions facing the Padma river complaint of river erosion and ask for bank protection.



Photograph 5.2: PRA Session in Dohar

Table 5.1: Major Problems Identified by the PRA Participants

Union	Major Problems
Bilashpur	<ul style="list-style-type: none"> ▪ The union is surrounded by the river Padma and river bank erosion agriculture and livelihood of the rural people; ▪ Water logging during monsoon constrain winter crop production; ▪ Road communication poor and deter is
Kushumhati	<ul style="list-style-type: none"> ▪ Waterlogging is severe in the union and prolonged water logging damage standing crops and prevent crop cultivation.
Mohamudpur	<ul style="list-style-type: none"> ▪ River bank erosion is severe in the union; ▪ Road communication is bad and affecting marketing of agro-commodities; ▪ Waterlogging affect part of the union;
Mukshudpur	<ul style="list-style-type: none"> ▪ Waterlogging is serious in the union; ▪ River bank erosion.
Narisha	<ul style="list-style-type: none"> ▪ River bank erosion affecting lives and livelihood of rural people; ▪ Prolonged waterlogging is severe in Narisha Union; ▪ Defective drainage system; ▪ Unplanned urbanization
Nayabari	<ul style="list-style-type: none"> ▪ River bank erosion affecting lives and livelihood of rural people; ▪ Prolonged waterlogging is severe in Narisha Union;
Roypara	<ul style="list-style-type: none"> ▪ Water Logging problems; ▪ Roods and communication is poor; ▪ Hat bazars not in good condition
Sutarpara	<ul style="list-style-type: none"> ▪ River bank erosion; ▪ Water Logging problems.
Municipality	<ul style="list-style-type: none"> ▪ Waterlogging is serious in the municipality area

PRA, 2016 Findings

CHAPTER-6: DEVELOPMENT POTENTIALS

Despite many challenges and constraints, the Dohar upazila has immense potential for diversifying crop production, livestock and fish production and enhance productivity. Potentials of the upazila are discussed in the following paragraphs.

6.1 Crop Agriculture

There is scope for vertical development of crop sub-sector by productivity enhancement through the use of modern varieties and improved management practices. Sustainable technology adoption through understanding of those within the environment is of prime importance. Potentials lies in the development of crop varieties and management techniques best suited in the agro-climatic condition prevailing in the area. With the above backdrop, the opportunities are analyzed to determine the potentials.

6.1.1 Transformation of Crop Agriculture with Potential HVCs

With rapid changing of food basket, demands for high value nutritious crops are increasing in Bangladesh. Economic growth, rising incomes and rapid urbanization are combining to shift food demand away from traditional staples toward high value foods. This creates an enormous opportunity for farmers, traders and processors for transformation from traditional to high value crop production, processing and marketing. The production, processing and marketing of many high value crops (HVCs) are labor intensive and embody an opportunity of rural employment generation. Benefits from cultivation of HVCs will include improvements in average farm incomes, improved nutrition among consumers and establishment of a secured base for production and postharvest skills, which would enable growers to avail themselves, over time, of higher value distribution options in the processing and export channels for crops. PRA with farming community divulged that crop productivity could be enhanced in almost all unions through better management of high yielding crops.

6.1.2 Promotion of Pulses in the Rice Based Cropping System

Pulses are major sources of protein and also most suitable for growing in the upazila. In these circumstances, household livelihoods and diet could be benefited by crop diversification and intensification through fitting short duration pulses (lentil, mung bean, chickpea, field pea, peanut, etc.) into new cropping niches. This tailoring process involves-introducing new short and super short duration cultivars, use of relay cropping (sowing pulses prior to the harvest of aman rice in rabi season, and in Kharif-I season) relaying pulses in the crops of previous season.

Review of demonstration results, BBS reports and discussion with the researchers and extension personnel, unveiled that there are huge yield gaps between the achievable yields and farmers' average yield of various pulse crops grown in the upazila.

Fortunately, NARS Institutes have developed a good number of pulse varieties appropriate for fitting into the rice-based pattern. Amongst the pulse varieties Bina masur-2,9,4,5 ,6,7 and 9; BARI masur-4 and 5; Bina mas-2 & 3; Bina mug 2,5,6,7,8; Bari-mug 6, 7, 8 and Bari chhola 5,6,7 are the suitable varieties to be fitted in the rice-based cropping pattern. Potential areas exist in Nayabari,Kushumhati, Roypara, Sutarpara, Narisha, Muksudpur and Mahmudpur unions.

6.1.3 Enhancing Productivity of Cereals

There are yield gaps between average yield and demonstration results in the region. The average yield (Ton/ha) of cereals in different seasons (boro rice, 4.47, T. aus rice 2.0, T. aman rice 2.57, wheat 1.87 and maize 7.0), and farmers' managed demonstration yields exhibits wide gaps in yield of cereals in the region. Since the region has a severe landscape with dominance of marginal and small farmers there is urgent need of tapping additional yields by bridging the yield gaps.

Measures

Productivity enhancement of major cereals requires the following measures:

- i) Intensification of cultivation: Further increases in cereals production have to come from intensive cultivation but the option is hindered by both natural and man-made calamities of varying degrees. Use of modern varieties having stress tolerance and short duration characteristics with recommended dose of both organic manures and inorganic fertilizers and integrated approaches for pest and disease management are the core interventions towards achieving the desired goal.
- ii) Capacity enhancement of extension personnel: Traditional techniques of so called need based extension approach without ensuring accountability at all levels are not bringing desired change in the technology dissemination and adoption. Capacity of the extension personnel, especially those who are working at grass level need to be enhanced through training and exposure to the latest technologies developed by national and international research organizations as well as their efficiency in organizing commodity based farmers' groups.
- iii) Ensuring supply quality inputs and credit support: Quality inputs need to be made available at the doorstep of farming community in time and at reasonable price. As the farmers are mostly poor to enable them for using quality inputs and modern technologies credit should be provided at easy term both from GO and NGO sources. Assessment of crop based credit requirement and a committee at upazila level should monitor disbursement.

6.1.4 Promotion of Oil Crops

The upazila is dominated by medium low land. if proper drainage system could be ensured for early recession of monsoon water oil crops area could be increased in the upazila during the winter season. The productivity of oil crops could also enhanced through using modern varieties. Realizing the yield ceiling of the oil crop varieties cultivated in Bangladesh, a good number of varieties developed have been developed by NARS Institutes. Some of these are short duration but high yielding and potentially suitable for the upazila. Amongst the newly developed varieties Bina Sarissa-3, and 4; Bari Sarissa-10; Bina Teel 2,3; Groundnut varieties-DM-1, Jinga badam, Bari badam5 and 6 are potential varieties for the upazila. There is a need for large-scale demonstration of these varieties and scaling up of the results for large-scale production.

6.2 Fishery

6.2.1 Riverine Fishery

Community based fisheries management: Large area of public water bodies exists in Nilokhai, Bayratola Dakshin, Seruail and Sannysirchar unions with low productivity of

fisheries. The community based fishery management by involving CBOs and NGOs is a good option for efficient management of public water bodies. It will also create the alternative income sources for poor fishers. The local administration should arrange the distribution of public water bodies among the real fishers and their capacity need to be increased to enhance productivity.

Establishment of community managed sanctuary: Establishment and maintenance of fish sanctuaries is one of the key instruments to maintain the sources of fish fingerlings and to conserve aquatic diversity. To enhance productivity of riverine ecosystem as well as to conserve biodiversity, wetland sanctuary may be actively considered in feasible areas. The river, canals and khals of the upazila are almost silted up in upazila. Government should take up a vigorous re-excavation program of all the water bodies and in all main courses of river and canals delineating potentials location of sanctuaries.

6.2.2 Beel and Floodplain Fishery

Expansion of small-scale aquaculture technologies: In the recent past years, small-scale floodplain aquaculture is popularizing at community level. Small-scale aquaculture in potential areas may be actively considered as one of the important adaptation measures of climate change impacts. It could be an alternative option of increasing open-water productivity.

Establishment of co-management approaches: Presently government is emphasizing to ensure co-management approaches of the potential beel and floodplain fisheries to explore its due potentials. Through strengthening CBOs, co-management approaches may be established for ensuring biological production system in beel and floodplain fisheries.

6.2.3 Pond Aquaculture

For sustainable aquaculture expansion, seed (spawn/ fry/fingerling) and feed are the most important production inputs. But now-a-days quality seed and feed becomes more crucial for sustaining the aquaculture production. More attention can be paid to address the crucial issues.

6.3. Livestock

Clearly, increased livestock production will depend ultimately on the adoption of appropriate technology, improved support services, market access and infrastructural development. Following sector wise recommended development actions is need to exploring in the upazila for developing livestock resources.

Dairy sector

i) Productivity enhancement of commercial dairy farm by ensuring availability of imported semen of progeny tested Holstein- Friesian bulls having milk yield potentiality of 9,500 – 10,000 kg in 305 days, lactation period (about 32 liter/d). Inseminate to local cross-bred Holstein-Friesian cows having daily milk yield capacity of at least 10 liters with a lactation period of at least 300 days with imported semen mentioned above. Encouraging farmers to rear minimum 5 lactating cows under intensive management ensuring animal comfort, adequate nutrition, health care and breeding, proper calf and manure management. It will

ensure dairy cattle that will yield more than 6000-liter milk per lactation (305 days lactation period).

For semi-commercial dairy farm inseminating cross bred Holstein- Friesian cows (yielding 6-10 liter milk a day) reared under semi intensive management system with semen of progeny tested 50 percent Holstein- Friesian bulls (50 percent Holstein-Friesian X 50 percent Local) having milk yield capacity of about 4,500 liters in 305 days lactation period. Rear 2-5 lactating cows under semi-intensive system that is that is medium level of inputs supply ensuring animal comfort, adequate nutrition, health care and breeding, proper calf and manure management. It will yield more than 3000-liter milk per lactation (305 days lactation period).

For subsistence farming through inseminating native cows reared under low input production system with semen of progeny tested/ pedigree bulls of Sahiwal, Pabna cattle, RCC, Munshigonj, other improved Desi cattle. Encouraging farmers to rear 1-3 lactating cows under subsistence farming system that is moderate level of inputs supply ensuring animal comfort, adequate nutrition, health care and breeding, proper calf and manure management. To produce native dairy cattle that will yield more than 1000-liter milk per lactation (305 days lactation period).

Beef Sector

i) Productivity Enhancement for Beef

Introducing pure-bred Brahma cattle for commercial beef cattle farmers. Accordingly establishing pure-bred Brahma cattle breeding station with sufficient number of bulls (at least 5) and cows (at least 500) in the upazila headquarter. Providing soft loan, technical and regulatory support to interested entrepreneur for establishing the pure-bred Brahma cattle breeding station.

For commercial beef fattening encouraging pure-bred growing bull/steer of Brahma or Shahiwal or Shindhi or Pabna breed or cross-bred (Holstein-Friesian cross) or Red Chittagong bull calves of 150-200kg live weight in the feed lot and rear them for 4-6 months.

For commercial beef fattening encouraging farmers to rear at least 10 fattening bulls/steers under feed-lot management ensuring animal comfort, adequate nutrition, veterinary care, bio-security and proper manure management. It will ensure a growth rate of 0.8-1.0 kg/d for 4-5 months.

Productivity enhancement for Goat/Sheep by introducing purebred Boar goat and pure-bred Dorper sheep for commercial Goat/Sheep farm. Accordingly establish purebred Boar goat and pure-bred Dorper sheep breeding farm with sufficient number of bucks/rams (at least 50) and does/ewes (at least 500) in Dohar area at private sector. These farms will supply breeding stock to the small-scale commercial high-yielding goat/sheep farm. Providing soft loan, technical and regulatory support to interested entrepreneur for establishing the pure-bred Boar goat and/or pure-bred Dorper sheep breeding station.

Poultry Sector

i) Productivity enhancement for Chicken and Duck i) by establishing parent-stock farm of RIR and Fayoumi chicken to supply commercial strain of Sonali chicken at private sector. Providing soft loan, technical and regulatory support to interested entrepreneur for establishing the parent-stock farm of RIR and Fayomi chicken.

ii) Establishing parent-stock farm Khaki-campbell, Xing Ding, Indian Runner, Pekin and Mascovi ducks to supply commercial strains of egg and meat purpose ducks in Dohar at private sector. Providing soft loan, technical and regulatory support to interested entrepreneur for establishing these parent-stock duck farms.

6.4 Marketing and Value Chain Management

6.4.1 Improving Post-Harvest Management and Processing

Significant post-harvest losses in fruits and vegetables, and inadequate cold storage facilities are a major constraint in the region for transformation of high-value agriculture. Due to lack of many post-harvest arrangements, the market actors use illicit preservation techniques by applying hazardous chemicals, compromising on food safety. Food contamination exposure also occurs due to lack of processing capacity and lack of access to technologies to store harvested produce. Vegetables collection and processing centers need to be established at private level through soft loan to facilitate cleaning, sorting, packaging and transporting to urban areas. Establishing agro-processing center in the upazila will enhance employment opportunities for women. On-farm sorting, pre-cooling, packing and storage facilities for fruits and vegetables are essentially required for distant/export marketing.

6.4.2 Improving market linkages and development of value chains

a) Improvement of roads and market infrastructure

A number of priority investments have been identified: (i) Construction and adequate maintenance of rural roads to facilitate marketing of products and access to services in particular in remote areas. (ii) Construction or rehabilitation of rural markets including the supply of potable water, drainage, and storage facilities to improve conditions. (iii) Improvement and rehabilitation of wholesale markets in major cities; (iv) Private storage facilities to reduce losses and increase value added.

b) Capacity building of value chain actors and market promotion

The potential area investments are: (a) Capacity building of farmers for group marketing and inputs procurement at community level (b) Capacity development of farmers and market intermediaries through training in food quality and safety regulations and requirements, good agricultural practices (GAP) so as to comply with market requirements; (c) Improved post-harvest management, value chain analysis and facilitation (d) Facilitate coordinated, market-based action, harnessing the productive capacity of agriculture to drive food security, environmental sustainability and economic opportunity. (e) Enhance opportunities for participation of women for value chain development

6.5 Findings from PRA on Agriculture Related Potentials

6.5.1 Potentials of Development

The participants of each union first, chalked out a long list of potentials. Finally, with discussions the participants finally selected five potential areas. Almost all unions unanimously call fertile agricultural land as a major resource of their respective areas. They also point dairy farming and fishery as two important resources that can bring prosperity. Unused manpower has been identified another major resource. Proper employment of this resource can bring wellbeing of the local families leading to social wellbeing.

Table 6.1: Major Potentials Identified by the PRA Participants

Union	Potentials
Bilashpur	<ul style="list-style-type: none"> Scope of enhancing productivity of crop agriculture through use of quality inputs and practicing modern technologies; There are immense scope of development in fisheries and livestock sub-sectors; Backyard poultry, goat and dairy farming; There is immense scope for precision agriculture and improving value chain management of agro-commodities
Kushumhati	<ul style="list-style-type: none"> There is potentials for productivity enhancement of crop agriculture through judicious use of chemical fertilizers, proper pest management and organized farming; There is scope for dairy farming, layer poultry farming on commercial basis; and Huge potentials for pond fisheries development.
Mohamudpur	<ul style="list-style-type: none"> Potentials exists for crop productivity enhancement through use of quality inputs and organized farming; Opportunity exists for dairy farming, poultry/duck farming; and Inland fisheries development.
Mukshudpur	<ul style="list-style-type: none"> Potentials exists for crop productivity enhancement through use of quality inputs and organized farming; Opportunity exists for dairy farming, poultry/duck farming; and Inland fisheries development.
Narisha	<ul style="list-style-type: none"> Potentials exists for crop productivity enhancement through use of quality inputs and organized farming; Opportunity exists for dairy farming, poultry/duck farming; and Inland fisheries development.
Nayabari	<ul style="list-style-type: none"> Potentials exists for crop agriculture productivity enhancement; Opportunity of dairy farming, poultry farming and duck farming; Potentials for Inland Fisheries development
Roypara	<ul style="list-style-type: none"> Opportunity of poultry farming. Fisheries development.
Sutarpara	<ul style="list-style-type: none"> Using fertile land crop productivity could be enhanced; Improvement of postharvest management and value addition to agro-commodities; Opportunity of dairy farming. Enough water bodies for fisheries development. Opportunity of poultry farming.

Union	Potentials
Municipality	Potentials exists for development of pack house for sorting and packaging agro-commodities for Dhaka super markets and export as well.

PRA, 2016 Findings

The above areas of agriculture development potentials can be summarized based on area of development and potential unions. Major potentials of the upazila are provided in the table 6.3.

Table 6.2: Summary of Development Potentials in Dohar

1. Scope of agricultural development	Bilashpur, Narisha, Sutarpara, Nayabari, Mukshudpur, Kusumhati and Mohammadpur.
2. Scope of fisheries development	Mahmudpur, Muksudpur, Narisha, Bilashpur, Sutarpara, Roypara, Kushumhati, Nayabari
3.Scope of cattle and goat farming	Mahmudpur, Muksudpur, Narisha, Bilashpur, Sutarpara, Roypara, Kushumhati, Nayabari
4. Scope for poultry farming.	Roypara, Sutarpara, Narisha
5. Scope for social forestry	Narisha, Bilashpur
6. Scope of hat and bazar development.	Narisha , Bilashpur, Municipality

CHAPTER-7: CONCLUSION

Since agriculture is backbone of rural economy, productivity enhancement in agriculture sector could contribute in poverty reduction and ensure food security at household level. Though breaths near the ears of Dhaka mega city, the socio-economic condition of the Dohar upazila did not developed as expected. May be due to its less connectivity to other districts. However, the Padma Multipurpose Bridge has opened its importance to other districts.

The primary goal of this report is provide a snapshot of the agriculture sector of Dohar upazila with its biophysical resource base, current practices, constraints and challenges along with potentials for sub-sectoral development. It also indicates future course of actions for a healthy and vibrant sector to contribute in food security, job creation and adding value to raw materials, particularly, for food industries.

The information for this study has been collected and collated from diverse and reliable sources to construct a vivid picture of the state of agriculture in the upazila. Study reveals that despite significant structural changes in agriculture in Bangladesh over the past 2-3 decades, not many changes have been observed in Dohar upazila. The upazila has immense opportunities for value addition to agro-commodities for export along with feeding Dhaka City. Therefore, agriculture in this potential upazila needs a paradigm shift from low-value traditional farming to large-scale commercial farming of high-value agro-commodities with facilities for value addition.

For the above purpose, it is crucial to take the following actions:

Crop Agriculture:

- i) Demarcating and preserving suitable agricultural land;
- ii) Establishing agricultural zones for precision agriculture and prohibiting encroachment of arable lands in village/rural areas;
- iii) Intensifying cultivation of crops and increasing productivity in the existing agricultural lands;
- iv) Protecting crop land from river bank erosion through embankment;
- v) Organizing farmers into groups and their capacity enhancement through training, credit facilities and excess to both input and output markets;
- vi) Introducing integrated program at upazila level under the leadership of upazila chairman.
- vii) Improving drainage system in the upazila to save crops and increase dry land crop cultivation in the winter season;
- viii) Not permitting brick burning within the close proximity of any agricultural zone;

Fishery:

- i) Demarcating and preserving existing water bodies;
- ii) Excavating and re-excavating water bodies and arranging community fisheries
- iii) Establishing union based demonstration farms in both public and private sectors to support fisheries in the upazila;
- iv) Organizing fishers into groups for their capacity building.

Livestock:

- i) Demarcating and preserving potential areas for cattle, goat/sheep and poultry/duck farming;
- ii) Increasing productivity of existing and future sources through capacity enhancement of DLS and supplying necessary inputs and capital for the farmers.

Agriculture Market:

- i) Improving rural road communication and landing stages at river bank for loading and unloading of commodities transported through water ways;
- ii) Improvising existing rural markets with necessary facilities for cleaning, grading and packaging agro-commodities.
- iii) Ensuring access of farmers in the markets;
- iv) Constructing necessary infrastructure for temporary storing of perishable agro-commodities
- v) Arranging vans for transporting agro-commodities to the urban area on PPP.

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Appendix 1

গৃহায়ন ও গনপূর্ত মন্ত্রণালয়

নগর উন্নয়ন অধিদপ্তর

“প্রিপারেশন অব ডেভেলপমেন্ট প্লান ফর ফোরটিন উপজেলাস” প্রকল্প

(প্যাকেজ নং-১ দোহার ও নবাবগঞ্জ উপজেলা, জেলাঃ ঢাকা এবং শিবচর উপজেলা, জেলাঃ মাদারীপুর)

পরামর্শক প্রতিষ্ঠান : দেশ উপদেশ লিঃ ইন এসোসিয়েশন উইথ আইমা ইন্টারন্যাশনাল বিডি লিঃ এন্ড টেকনিক্যাল সাপোর্ট সার্ভিসেস লিঃ

কৃষি জরিপ প্রশ্নমালা-২০১৫

প্রশ্নমালা নংঃ [শুধুমাত্র অফিসিয়াল ব্যবহারের জন্য] উত্তরদাতার নাম :-----

তথ্য সংগ্রহকারীর নামঃ..... কোডঃ তারিখঃ

১. ভূমির মালিকানা

ক. নিজস্ব জমি শতাংশ
খ. বন্ধক নেয়া জমি শতাংশ
গ. বর্গা নেয়া জমি শতাংশ
ঘ. মোট জমি শতাংশ

২. ভূমি ব্যবহার

ক. বসত ভিটা ও তৎসংলগ্ন জমি..... শতাংশ
খ. আবাদী (মাঠ ফসলী জমির পরিমাণ) শতাংশ
গ. স্থায়ী বাগানের অধীনে জমির পরিমাণ..... শতাংশ
ঘ. অনাবাদী জমির পরিমাণ শতাংশ
ঙ. জলাশয়/পুকুর শতাংশ

৩. এক বছরে Gross ফসল উৎপাদন এর বর্ণনাঃ

কি কি ফসল উৎপাদন করেন (কোড লিখেন)	জমির পরিমাণ (শতাংশ)	উৎপাদন (কেজি)	উৎপাদিত ফসল থেকে বিক্রয় করেন (কেজি)

কোড ৩.ঃ ফসল উৎপাদন

১. ধান	২. গম	৩. পাট	৪. ভুট্টা	৫. ইক্ষু	৬. ডাল	৭. আলু	৮. বেগুন	৯. লাউ	১০. কুমড়া
১১. পটল	১২. শসা	১৩. টমেটো	১৪. ফুলকপি	১৫. আম	১৬. কলা	১৭. কাঁঠাল	১৮. লেবু	১৯. পেয়ারা	২০. লটকন
২১. অন্যান্য.....			২২. তৈল বীজ (সরিষা, বাদাম ইত্যাদি)			২৩. মসলা (পিয়াজ, রসুন, আদা ইত্যাদি)			

৪. গরু / মহিষ / ছাগল পালন করেন? ☐ ১= হ্যা ২= না ৪.১. উত্তর হ্যা হলে গরু / মহিষ / ছাগল সংখ্যা কয়টি?
 ৫. হাস মুরগী খামার আছে কি? ☐ ১= হ্যা ২= না ৫.১. উত্তর হ্যা হলে হাস মুরগীর সংখ্যা কয়টি?

৬. এসব থেকে গত এক (১) বছরে খরচ ও আয়ের পরিমাণ (টাকায়)?

আইটেম	খরচ	আয়
ফসল		
হাসমুরগি		
গবাদী পশু		
মাছ		

কোড ৬ঃ খরচ ও আয়

১. ১০০০০-২০০০০	২. ২০০০০-৩০০০০	৩. ৩০০০০-৪০০০০	৪. ৪০০০০-৫০০০০	৫. ৫০০০০+
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৭. চাষের ব্যবস্থা কি? টিক (✓) চিহ্ন দিন

১. লাঙ্গল	২. পাওয়ার টিলার	৩. স্থানীয় পদ্ধতি	৪. অন্যান্য
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৮. সেচের ব্যবস্থা কি কি? টিক (✓) চিহ্ন দিন

১. গভীর নলকূপ	২. অগভীর নলকূপ	৩. শক্তি চালিত পাম্প	৪. ডিজেল চালিত	৫. বিদ্যুৎ চালিত	৬. স্থানীয় পদ্ধতি	৭. অন্যান্য....
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৯. আপনার শস্য ক্ষেত্রের পানি নিষ্কাশনে কোনো সমস্যা আছে কি? ☐ ১= হ্যা ২= না (হ্যা হলে ১০ নং এ যান)

১০. সমস্যাগুলো কি কি?

- ১.
- ২.
- ৩.

১১. সেচ সুবিধা সম্প্রসারণের ফলে শস্য বহুমুখীকরণ বেড়েছে কি? ☐ ১= হ্যা ২= না (হ্যা হলে ১২ নং এ যান)

১২. যদি বেড়ে থাকে তবে নতুন ফসল কি কি?

- ১.
- ২.
- ৩.

১৩. সেচ সুবিধা সম্প্রসারণের ফলে গত ১০ বছরে শস্যের উৎপাদন বেড়েছে কি? ☐ ১= হ্যা ২= না (হ্যা হলে ১৪ নং এ যান)

১৪. যদি বেড়ে থাকে তবে ফসল ভিত্তিক শতকরা কত ভাগ?

১. ধান.....%
২. ভুট্টা.....%
৩. গম
৪. সবজি
৫. ডাল
৬. তৈল বীজ
৭. পাট
৮. অন্যান্য

১৫ চাষাবাদের ধরন কি? টিক (✓) চিহ্ন দিন

১. এক ফসলি	২. দুই ফসলি	৩. তিন ফসলি
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১৬. কোথায় বাজারজাত করেন? টিক (✓) চিহ্ন দিন

১. স্থানীয় বাজার	২. স্থানীয় পাইকার	৩. বাহিরের আড়তদার	৪. মাঠ পর্যায়ে	৫. অন্যান্য.....
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১৭. কৃষি ব্যবস্থাপনা কিভাবে হয়? টিক (✓) চিহ্ন দিন

১. স্থানীয় পদ্ধতিতে	২. সরকারী ভাবে প্রশিক্ষণ	৩. বেসরকারী ভাবে প্রশিক্ষণ	৪. অন্যান্য.....
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কৃষিজাত পণ্যের মূল্য সংযোজন ও বাজারজাতকরণ

ক) বাজার প্রবেশাধিকার

পণ্যের নাম	গত ১২ মাসে বিক্রয়ের পরিমাণ (কেজি/লিটার/সংখ্যা)	কার কাছে বিক্রয়	বিক্রয়ের স্থান	বাজার হতে বাড়ীর দূরত্ব, কি.মি.	পরিবহনের জন্য ব্যবহৃত যানবাহনের নাম	পরিবহন খরচ
ধান						
গম						
পাট						
ভুট্টা						
তেল বীজ						
ডাল ফসল						
সজি						
ফল						
হাঁস/মুরগী						
দুধ						
ডিম						
গরু/মহিষ						
ছাগল/ভেড়া						
মাছ						
মসলা জাতীয় ফসল (যেমন পিঁয়াজ, রসুন ইত্যাদি. . .)						
অন্যান্য (উল্লেখ করুন-----)						

কোডঃ ক্রেতা : ১ = ক্ষুদ্র ব্যবসায়ী/ফড়িয়া, ২ = পাইকারী ক্রেতা/বেপারী, ৩ = আড়তদার, ৪ = ভোক্তা,

বিক্রয়ের স্থান : ১ = বাড়ী, ২ = বাজার, ৩ = সংগ্রহ কেন্দ্র,

যানবাহন কোড :

১ = পায়ে হেঁটে ২ = বাই-সাইকেলে ৩ = রিক্সা ৪ = ভ্যান ৫ = ঠেলা গাড়ি ৬ = বাস ৭ = ট্রাক ৮ = টেম্পো/ অটোরিক্সা/ নসিমন

৯ = নৌকা/ট্রলার ১০ = অন্যান্য (-----)

মতস্য

জলাশয়ের বিবরণ/বর্তমান অবস্থা:

(ক) জলাশয়ের আয়তন (শতাংশ):

- (১) সর্বোচ্চ আয়তন----- (২) সর্ব নিম্ন আয়তন-----
 (৩) গড় আয়তন-----

(খ) জলাশয়ের গভীরতা (মিঃ):

- (১) শুষ্ক মৌসুমে----- (২) বর্ষা মৌসুমে-----
 (৩) গড় -----

(গ) জলাশয়ে মাছ চাষের বর্তমান কার্যক্রমঃ

- (১) প্রাকৃতিক আবাদ----- (২) ব্যক্তিগত আবাদ-----
 (৩) দলীয় বা কমিউনিটি আবাদ----- (৪) পলি দোআঁশ-----

(ঘ) জলাশয়ে মাছের প্রাপ্যতাঃ

ক্রমিক নং	স্থানীয় নাম	গত বছরের উৎপাদন (কেজি)
১	রুই	
২	কাতল	
৩	মুগেল	
৪	গ্রাস কার্প	
৫	সিলভার কার্প	
৬	সরপুটি	
৭	তেলাপিয়া	
৮	পাঙ্গাস	
৯	কই	
১০	মাগুর	
১১	শিং	
১২	পুটি/টেংরা/ মলা/ ঢেলা	
১৩	চিংড়ি	
১৪	অন্যান্য (উল্লেখ করুন)	

(ঙ) আপনি কি মাছ/ কৃষি/ গবাদী পশু/ পোলট্রি চাষের জন্য গত বছর ঋণ গ্রহণ করেছিলেন?

☐

১= হ্যাঁ

২= না

যদি করে থাকেন কত টাকাঃ -----টাকা

(চ) কার কাছ থেকে ঋণ গ্রহণ করেছেন? টিক (✓) চিহ্ন দিন

১. এনজিও	২. কৃষি ব্যাংক	৩. বেসরকারী ব্যাংক	৪. মহাজন	৫. অন্যান্য
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Appendix 2



